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ERRATUM.

p. 19, line 8—for *Pigiopsylla* read *Pygiopsylla*.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. 5.] 1915. [No. 1-8

TROPICAL SKIN DISEASES.

Chalmers (Albert J.) & Marshall (Alexander). **The Systemic Position of the Genus *Tricophyton* [*Trichophyton*] Malmsten, 1845.** *Jl. Trop. Med. & Hyg.* 1914. Oct. 1. Vol. 17. No. 19. pp. 289-291. With 5 figs.

The authors state that, as a rule, no mention of the genus *Trichophyton* is to be found in the larger works on fungi or, if it is found, it is used only as a synonym. They therefore go into the history of the subject and refer to a *Trichophyton* discovered by themselves as a common cause of ringworm of the head of school boys in Khartoum and Omdurman [see p. 3.] The conclusions reached are:—"That the genus *Trichophyton* Malmsten, 1845, belongs to the family *Gymnoascaceae* Baranetzky, 1872, which is included in either Brefeld's *Hemiascomycetes* or De Bary's *Ascomycetes*, according to the form of classification adopted by the reader."

[The paper is a somewhat technical one and should, therefore, be consulted in the original by those interested in the subject.]

229704

G. C. L.

Brault (J.) & Viguier (A.). **Kérion dû au *Trichophyton granulosum* observé à Alger.**—*Bull. Soc. Française de Dermatol. et Syph.* 1914. Apr. Vol. 25. No. 4. pp. 207-210. With 1 text fig.

The condition was seen in a child aged eleven. Though its parents were Italians the child had been born in Algiers and had always lived there. On the left parieto-occipital region there was a lesion having a typical kerion appearance. It was of a light red colour, of orbicular shape and was four to five centimetres in height with a breadth of little less. The surface was cribriform in appearance and light pressure caused much pus to exude. Cultures were eventually made from the lesion and it was found that a fungus was responsible, this giving the characteristic cultural diagnosis of *Trichophyton granulosum*. A speci men of the culture was sent to Sabouraud, who confirmed this diagnosis.

G. C. L.

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BRAULT (J.) & VIGUIER (A.). **Note sur une Nouvelle Espèce de Trichophyton à Culture Faviforme isolée à Alger.**—*Compt. Rend. Soc. Biol.* 1914. July 17. Vol. 77. No. 25. pp. 342–343.

In two children born in Algiers, and who had always lived there, the authors observed two typical kerions due to a new species of Trichophyton, giving a faviform appearance in cultures. They place the new fungus in the faviform group, because of its disposition in the hairs, which shows that it is a megalosporon ectothrix, and also on account of its characteristic appearance in cultures. As the organism did not conform to any of the known species of the faviform group cultures were sent to SABOURAUD, who stated that it was a new species. The authors propose therefore to study it in greater detail, and because its development is more rapid than that of other known species they give it the name of *Trichophyton luxurians*.

G. C. L.

BRAULT (J.) & VIGUIER (A.). **Les Champignons des Teignes à Alger.** *Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 554–556.

In the last two years at the dermatological clinic at the hospital of Mustapha the authors have made a complete systematic study of certain ringworms. The results of their researches, as regards the scalp, were as follows:—

Trichophytons endothrix.—*T. acuminatum*, 8 cases; *T. violaceum*, 4 cases; *T. crateriforme*, 2 cases; Trichophyton having the appearance of *T. polygonum*, 1 case.

Trichophytons ectothrix.—*T. granulosum*, 1 case; and a new species showing a faviform culture to which the name of *T. luxurians* was given (see above).

Of skin ringworms *T. acuminatum* was met with. Epidermophytons were seen in fifteen cases and twenty-three cases of favus of the scalp were noted. The authors propose to give the name of *Achorion quinckeanum* to the parasite causing the latter disease in Algiers.

G. C. L.

DE NAPOLI (Ferdinando). **Le Tigne nell'Oasi di Tripoli e la Cura dei Tignosi in Libia.** [Ringworm in the Oasis of Tripoli and the Cure of Ringworms in Lybia.]—*Giorn. d. Med. Militare.* 1914. July 31. Vol. 62. No. 7. pp. 611–624. With 1 plate.

Affections by various tineas are common in the oasis of Tripoli, occurring in the forms of endemics or epidemics and not in isolated sporadic cases or isolated foci. The following is a list, in order of frequency, of parasites isolated by the author:—*Achorion Schönleinii* 37 times; *Trichophyton cerebriforme*, 16 times; *T. violaceum*, 11 times; *T. plicatile*, 9 times; *T. acuminatum*, 3 times; *T. crateriforme*, 2 times; *T. regulare*, once; *T. faviforme*, once. A detailed description is given of these different forms.

The author believes that modern treatment offers a secure and absolute means against trichophytons and that favus also responds well to local medical measures. Chief amongst physical means come X-rays, and in the author's hands radio-therapy has given good results, bringing about depilation in a very short time. Where depilation is not complete the remaining hair should be removed by forceps. In other instances cases were treated by means of adhesive plasters and by applications of tincture of iodine or of chrysarobine ointment. Radiotherapy, however, offers the best means of cure. This method, according to the author, has in Paris produced an annual economy of 400,000 lira. Though not feasible in all instances in out of the way places such as Lybia, still he hopes that it may be employed where possible.

G. C. L.

CHALMERS (Albert J.) & MARSHALL (Alexander). **Tinea Capitis Tropicalis in the Anglo-Egyptian Sudan.**—*Jl. Trop. Med. & Hyg.* 1914. Sept. 1. Vol. 17. No. 17. pp. 257–265. With 2 plates and 1 text-fig.

So far as the authors are aware no researches have hitherto been made to differentiate the form of Tinea capitis tropicalis found in the Anglo-Egyptian Sudan. They state that up to the present they have found only one species of the genus Trichophyton which appears to differ somewhat from those usually described.

The history of ringworm in the Tropics is described and a list of the fungi at present recognised to be the causal agents of Tinea capitis tropicalis is given.

This is as follows :

"Genus *Microsporum*, Gruby, 1843.

"(1) *M. audouini* Gruby 1843, found in Brazil, Senegal, the Western Sudan and Madagascar.
"(2) *M. fulvum* Uriburu 1907, found in the Argentine.

Genus Trichophyton Malmsten 1848.

'(1) *T. circonvolutum* Sabouraud 1909, found in Senegal and Dahomey.
'(2) *T. exsiccatum* Uriburu 1909, found in the Argentine.
'(3) *T. polygonum* Uriburu 1909, found in the Argentine.
'(4) *T. sabouraudi* R. Blanchard 1895, found in Brazil.
'(5) *T. soudanense* Joyeux 1912, found in the Western Sudan.
'(6) *T. violaceum* Bodin 1902, found in North Africa.
'(7) *T. violaceum* varietas *decalvans* Castellani 1905, found in Ceylon."

The variety of tinea found by the writers was observed in Omdurman and Khartoum in Sudanese boys and youths about ten to sixteen years of age. The infected persons showed one or more white patches upon their heads, composed of white scales, of normal hairs and of hairs broken off about a millimetre above the surface of the skin. Such broken hairs when removed and soaked in forty per cent. caustic potash for some hours show very distinctly rows of spores inside the shaft of the hair, though none are to be seen in the sheath or cortex. Pure cultures were obtained and it was found that the trichophyton grew well aerobically at 20° and 34° C. and quickly at 37°, but not so well at 40°. Anaerobically no growth took place. Various media were employed. A list of these is given together with the characteristic growths seen. As regards animal inoculations, negative results were obtained with inoculations direct from a patient's head into a monkey, a cat, a dog and a white mouse, and also with inoculations of cultures into another series of animals of the same species.

For reasons which the authors hope to deal with in another paper they conclude that "this fungus belongs to the class of *Fungaceae* of Linnaeus, called *Ascomycetes* by DE BARY, which includes BREFELD'S hemi-ascomycetes, unless this is taken as a separate division, in which case the fungus in question would belong to this division. It also belongs to the family *Gymnoascaceae* Zopf, 1885, and to the genus *Trichophyton* Malmsten 1848, which MATRUCHOT and DASSONVILLE have already demonstrated to belong to this family. It comes under MALMSTEN'S genus Trichophyton because :—

"(1) It is parasitic in hairs and in the skin.
"(2) Its hyphal segments (so-called spores) are large, 4·5μ in diameter.
"(3) In cultures it possesses conidia on short conidiophores.
"(4) It possesses spirally curved hyphae.

"It belongs to the division of the genus Trichophyton called Endothrix because it develops solely in the interior of the hair and does not cause suppuration."

Alopecial patches are usually small and not noticeable, and the prognosis as regards baldness appears to be good.

A variety of remedies was tried, tobacco soap being found the most useful. The disease apparently spreads but slowly, so periodical inspections of all scholars and a prompt treatment of such cases should do much to prevent its incidence. A series of plates is given showing the appearance of the lesions on the scalp and also the characteristic growths in the different cultural media. The name *Trichophyton currii* is proposed.

G. C. L.

McMURTRIE (K.). **A Case of Mycetoma (Madura Foot) in the Transkei.** —*S. African Med. Record.* 1914. May 23. Vol. 12. No. 10. p. 164.

A native woman, aged 62, was recently seen by the author with a swelling about two inches in circumference on the dorsum of the left foot. There were several sinuses in connection with this, but no bone could be felt on probing, and there was very little discharge. The swelling and sinuses were said to have existed for about five years, but there had been very little pain, the patient still being able to walk on the foot. The popliteal and femoral glands were not appreciably enlarged. The condition suggested the possible presence of a foreign body, but there was no history to support this view, and probing was also negative.

The swelling was explored under an anaesthetic, and it was found that the interior consisted of a multilocular cavity filled with firm black granules roughly cubical in shape, somewhat resembling charred match heads. Some of these were sent to the Government Laboratory for a microscopical diagnosis and fungi arranged in radial masses like actinomyces clumps were found. The diagnosis was therefore one of the black variety of mycetoma (Madura foot).

G. C. L.

RUDOLPH (Max). **Ueber die brasilianische "Figueira."**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. July. Vol. 18. No. 14. p. 498.

Brazilian Figueira resembles closely blastomycosis. The condition occurs in the States of Minas Geraes and Goyaz, where an apparently similar condition is seen in cattle. In man the disease begins as a small wart-like growth on the back of the foot, which in the course of years develops into a cauliflower-like papilloma, the lymphatic system eventually becoming implicated. Some physicians believe the condition is a hypertrophic lupus, others a skin cancroid.

The author, however, isolated an apparently identical blastomycete from four out of six of his cases. On artificial media the organism develops as a dark brown to black growth; it grows especially well on Sabouraud's medium. Though it cannot be definitely said that the disease of cattle is the same as that of men, yet most of the patients were from the country and had been in contact with cattle suffering from Figueira. G. C. L.

SOPRANO (Edoardo). **Contributo allo Studio dell'Ulcera Fagedenica dei Paesi Caldi, o Piaga Tropicale.** [Contribution to the Study of Phagedenic Ulceration in Hot Climates or Tropical Ulcer.]—*Giorn. d. Med. Militare.* 1914. June 30. Vol. 62. No. 6. pp. 508–516.

A very good description of the condition is given. It is pointed out that the infection often takes place through some small excoriation or scratch on the skin. Some people are more liable to acquire the malady than others; specially those debilitated by alcohol, chronic dysentery and syphilis. The cause of the condition, as has now been so often pointed out, is a bacterial spirochaete association (Vincent's bacillus). The lesion once started quickly progresses, and necrosis of the tissues takes place, leading to deep ulceration and sloughing. Complications such as diffuse gangrene, tetanus, erysipelas, slight cachexia, diarrhoea and profuse haemorrhage are mentioned by the author. The diagnosis in general is easy, but has to be made from oriental sore, yaws, and various syphilitic ulcerative conditions. The disease is prevented by careful attention to all wounds, and co-existing maladies, such as malaria and syphilis, should be suitably treated.

As regards treatment the thermocautery, scraping, and various caustics are recommended. Later, to stimulate granulations, tincture of iodine, airol, vioform and iodoform are all recommended.

[The importance of early diagnosis and treatment is apparent in dealing with large bodies of troops.]

G. C. L.

JOUVEAU-DUBREUIL (H.). **Ulcère phagédénique à Tchentou (Setchouen, Chine).**—*Bull. Soc. Path. Exot.* 1914. June. Vol. 7. No. 6. pp. 469–472.

Phagedenic ulceration was first described at Setchouen in 1909 by ASSMY, who observed it in patients in the German hospital of Tchongking. In the pus of these ulcers he encountered (1) a fusiform bacillus, (2) a short curved bacillus, (3) spirochaetes, and (4) other organisms. JEFFERYS and MAXWELL report this description of ASSMY'S as the first made of that affection in the whole of China.

In the space of some months the author encountered five cases at Tchentou, which corresponded with the well known descriptions of the disease. The symptoms he describes are characteristic, and fusiform bacilli and spirochaetes were found in the ulcers.

G. C. L.

BARLOW (Nathan). **Ulcus Interdigitalis Foetidum.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1914. June. Vol. 1. No. 12. pp. 868–869.

Three cases of a form of interdigital ulcer causing prolonged debility are described. One of the cases was a secondary infection to hookworm disease, the second to a slight wound, while the third originated independently. The author believes the condition to be a specific infection due to a special organism.

The patient first notices pain in an already existing fissure, this gradually enlarging to an irregular ulcer with a tendency to invasion of the other interdigital clefts of the same foot. The floor of the ulcer is bright red in colour, the surrounding skin being white and sodden in appearance. Serum oozes out but no blood. Pain is marked. The affected foot and ankle and, after walking, even the calf become swollen.

For treatment, 5 per cent. cocaine is useful if the pain is severe. Pledgets of cotton saturated with 3 per cent. salicylic acid in alcohol are then applied for five minutes, being replaced by dry cotton, which should be frequently changed, so as to keep the part absolutely dry.

This procedure is repeated twice daily until the ulcer has completely healed. The patient should be warned against walking until all pain has disappeared. This generally takes three or four days and after that limited walking may be permitted, the entire front of the shoe being cut away to prevent pressure on the part.

G. C. L.

DOLLEY (Gilman C.). **The "Blue Button," an Undescribed Type of Tropical Ulcer of the West Indies, with Notes upon a Diplococcus Specific to the Disease.**—*Military Surgeon.* 1914. Sept. Vol. 35. No. 3. pp. 246–250. With 1 text fig.

During practice in the Dominican Republic the author had exceptional opportunities of studying large numbers of ulcers, which came to a dispensary under his care. The greater part proved to be specific in origin, but in eighteen cases the ulcers were of a distinctly different type. From these the author succeeded in growing a large uncapsulated diplococcus, fully twice the size of the diplococcus of NEISSER. In one instance pus from a newly opened blue button was applied to the scarified skin of a white volunteer and within several days a typical button developed at the point of inoculation. When this was incised it yielded a practically pure culture of the same diplococcus. After infection has taken place a tumour develops in exactly the same manner as a moderately large furuncle. There is pain, redness, heat and swelling and in from five to seven days the maximum is reached, the full size being not quite as large as a pigeon's egg. The colour is dusky bluish red on the top, fading to an inflammatory red at the periphery. Fluctuation then appears and rupture, unless the part is opened surgically. After this a more or less circular floored ulcer remains, discharging a thin sanguineous pus. If this is untreated, an increase in size takes place and there is little tendency towards spontaneous healing. The best treatment, the author found, was to curette and to trim the walls and floors of the ulcer with scissors, after removal of the cores, the interior being painted with tincture of iodine at moderately frequent intervals, The healed sore leaves a thin, slightly puckered scar in the skin, not adherent to the subcutaneous tissues. The author's conclusions are as follows :—

"That 'The Blue Button' is a not unusual disease in the West India Islands and Antilles.

"That this disease is caused by a specific diplococcus, having peculiar morphological and cultural characteristics.

"That the disease is infectious but not contagious.

"That it is a local infection involving only the tissues of the skin.

"That as it occurs usually on covered parts of the body it is not borne by an insect such as a biting fly."

G. C. L.

WILLCOCKS (F. C.). **The Predaceous Mite** *Pediculoides ventricosus,* **Newport. A Parasite of the Pink Cotton Boll Worm, and an Account of its Relation to the Outbreak of a Supposed Skin Disease amongst Labourers engaged in Handling Cargoes of Egyptian Cotton Seed at the London Docks and at a Colchester Oil Mill.**—*Agricult. Jl. of Egypt.* 1914. June. Vol. 4. No. 1. pp. 31–52. With 1 plate.

In January, 1914, a number of dock labourers engaged in discharging certain cargoes of Egyptian cotton seed in the London Docks complained that the handling of this material produced a rash on the skin, accompanied by severe irritation and discomfort.

The cause of this has now been determined to be a mite (*Pediculoides ventricosus*), present in the seed as a natural parasite on the pink boll worm, one of its many hosts. This mite, according to the author, has long been known to cause occasional outbreaks of skin trouble amongst human beings handling or otherwise coming into contact with grain or straw infested with some insect on which it (the mite) is feeding as a parasite. A similar condition has been described in America, WEBSTER amongst others having given a good description of it. The rash appears to develop some twelve to sixteen hours after the patient has been exposed to the bites of the mite. Itching is very pronounced and is worst at night. The lesion produced is described by WEBSTER as a vesicular urticaria and is generally seen on the back, sides and abdomen and less frequently on the arms and legs. The neck is seldom involved and the face, hands and feet generally escape. In severe infections the complaint has been mistaken for smallpox. [The subsequent course of the disease and treatment is not mentioned.] As regards future trouble in handling these cargoes the author believes that this will not long persist, at least in an acute form, as a campaign for the destruction of the pink boll worm, the mites' host, is now being carried on in Egypt.

G. C. L.

RAT (Joseph Numa). "**Raw Lip**".—*Trans. Soc. Trop. Med. & Hyg.* 1914. June. Vol. 7. No. 6. pp. 219–223.

Raw lip is a chronic affection of the lower lip met with as a rule only amongst the negro labouring classes and especially in those persons who work out of doors. The lip becomes very red and swollen, this varying in degree from a slight thickening to a marked hypertrophy, or even in some cases to a pendulous condition.

The redness appears to be due to superficial ulceration and is accompanied, in many cases, by an outgrowth of granulation tissue. The ulcerated surface, approximately a quarter of an inch wide, does not usually extend to the angles of the mouth.

The upper lip is never affected. The youngest patient noticed by the author was sixteen, the oldest seventy. The affection once begun continues for the rest of life; amelioration, however, and even temporary cures are sometimes seen.

There are no constitutional symptoms and the condition is not associated with any known diseases. Different treatments have been employed. Glycerine of resorcin has given the best results, but protargol has also proved useful. In one case the author removed the whole of the affected part with the knife under a general anaesthetic and the affection did not appear again for three years.

A series of cases is given.

G. C. L.

GESSNER (H. B.). **Case of Bilateral Ainhum.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1914. Sept. Vol. 2. No. 3. p. 206. With 1 plate.

An interesting case of bilateral ainhum is described. Spontaneous amputation of both little toes at the same time took place in 1907. The patient, a negro plantation labourer, was working in river sand at the time building a house. According to his account the process took one month, the condition being painless and not associated with any bad smell. He had never been out of Louisiana. A photograph is given.

G. C. L.

HARPER (F. S.). **Molluscum Fibrosum Pendulatum Atque Elephantiacum. A Short Account of a Case.**—*Jl. Trop. Med. & Hyg.* 1914. Oct. 1. Vol. 1. No. 19. p. 291. With 1 plate.

A short account of a case of molluscum fibrosum in a native woman living in the Northern Territory of the Gold Coast. The patient apparently was afflicted from an early age, and an interesting feature in her case was that her mother was similarly affected. Some very good photographs showing the distribution of the disease are given.

G. C. L.

MYIASIS.

FRANCAVIGLIA (M. Condorelli). (i) **Myiasis Auricolare per** *Sarcophaga carnaria* (**L.**). [Auricular Myiasis caused by *Sarcophaga carnaria.*] —*Boll. Accad. Gioenia Scienze Naturali in Catania.* 1913. Nov. Ser. 2. No. 28. pp. 7–10.

(ii) **Ancora sulla Mjiasi Auricolare.**—*Ibid.* 1914. May. No. 31. pp. 15–23.

i. In the last few years four cases of auricular myiasis, due to *Sarcophaga carnaria*, have been published in Italy. Francaviglia now supplies a fifth. The larvae in this case were sent to him by CONDORELLI of Catania, who had extracted them by forceps from the external auditory canal of a young peasant. The symptoms consisted of violent lancinating pains with a sensation of something moving in the external auditory canal, headache, giddiness and a tendency to convulsions. Deafness was also present and a sero-sanguineous foul smelling discharge came from the ear. To get rid of the parasites the author suggests a five per cent. solution of carbolic acid, to be followed up with irrigations of tepid boracic acid. Instead of this an oily liquid may be introduced into the ear, this acting by asphyxiating the larvae. Vapour of chloroform is another remedy. It is advisable to act quickly as otherwise the parasite may perforate the drum of the ear. A description of the fly is given.

ii. The author here mentions other species that have been found in the human ear, namely *Sarcophaga magnifica* Schiner, *Lucilia macellaria* Fabr., *Calliphora vomitoria* (L), and *Anthomyia pluvialis*. *S. magnifica* is common in districts of Russia. When found in the ear these larvae devour the soft parts of the auditory canal and frequently perforate the tympanum. As regards Italy, BIASOLI of Turin has described two cases of infection by this fly.

Lucilia macellaria (*Compsomyia macellaria*) is the well known fly which occurs in the Southern States of America, the West Indies, and the Isthmus of Panama. Cases of infection of the nose, ear and vagina by this parasite are common in those parts.

Calliphora vomitoria appears to be specially common in France.

Attacks by the *Anthomyia pluvialis*, the last of the list given above, have been recorded, but are apparently not very common.

G. C. L.

FRANCAVIGLIA (M. Condorelli). **Larva di** *Oestrus ovis* **L. per la Prima Volta rinvenuta nel l'Orecchio Umano.** [Larva of *Oestrus ovis* L. recovered for the First Time from the Human Ear.]—*Boll. Accad. Gioenia Scienze Naturali in Catania.* 1914. May. Ser. 2. No. 31. pp. 23–27.

A patient presented himself to the author suffering from severe pain in the right ear, radiating to the corresponding part of the head. There had been no vomiting nor vertigo, but the pains were associated with a sensation of something moving about in the ear. On examination a turbid serous discharge was noticed. Inspection of the ear showed that there was a foreign body present, so a saturated solution of chloroform was introduced. After a few minutes the foreign body, which proved to be a larva of a fly, was removed with fine forceps. An examination showed that it was the larva of *Oestrus ovis*.

G. C. L.

COATES (George M.). **A Case of Myiasis Aurium accompanying the Radical Mastoid Operation.**—*Jl. Amer. Med. Assoc.* 1914. Aug. 8. Vol. 63. No. 6. pp. 479–480.

A boy, aged 14, an inmate in the Pennsylvania Institution for the Blind in Philadelphia, was operated upon for middle ear disease, a radical mastoid operation being performed.

The dressings and packing were removed on the third day and then it was found that the wound had become infected with maggots, 40 or 50 of these coming away with the gauze or being washed out immediately afterwards. The species of maggot was not identified and the author cannot understand how the infection took place. There had been a chronic discharge from the ear before the operation, however, and it is likely that this was the channel of infection. The ear was packed with iodoform gauze, with the result that no further maggots were discovered at subsequent dressings.

G. C. L.

ROUBAUD (E.). **Le Larbish ou Oerbiss des Ouoloffs, Pseudo-Myiase rampante sous-cutanée du Sénégal.**—*Bull. Soc. Path. Exot.* 1914. May. Vol. 7. No. 5. pp. 398–401.

BÉRANGER-FÉRAUD in his clinical treatise on eruptions in Senegal describes, under the name of *Larbish*, a curious cutaneous affection called Oerbiss by the Ouoloffs which specially occurs during the winter months. The lesion is characterised by the appearance on the limbs or on the body of a small filiform canal apparently under the epidermis but showing up under the surface of the skin and filled with a clear serous fluid. The patients complain of a burning sensation and believe that there is a worm crawling about under their skin. The affection can last many months. The treatment consists of injections of sublimate or painting the canal with iodine. The condition is fairly frequent in Senegal and is also met with in other parts of West Africa. At first sight the disease appears to be identical with that special category of Myiases, named *Myiase rampante* or *Myiase linéaire* (Hautmaulwurf, Creeping Disease of German and English authors, Volostik of the Russians).

The author after considering the subject in detail believes that, though its clinical signs are similar to the affection just mentioned, the cases seen in Senegal on the West Coast of Africa, and in Brazil, are due to some other parasite.

G. C. L.

AUERHANN (Wilhelm). **Zwei Fälle von Hyponomoderma (Creeping Disease).** [Two Cases of Creeping Disease.]—*Dermatol. Wochenschr.* 1914. June 13. Vol 58. No. 24. pp. 673-676.

The first case was in a child three and a half years of age, the second in a female peasant. The author treated the former with the usual drugs used for scabies without effect and then by freezing with ethyl chloride. This seemed to have a good effect upon the condition. Later on the larva apparently came away, but the author did not actually see it. A short account of the literature of the subject is given, and some cases noted by other observers are mentioned.

G. C. L.

BLANKMEYER (H. C.). **Intestinal Myiasis. With Report of Case.**—*Jl. Amer. Med. Assoc.* 1914. July 25. Vol. 63. No. 4. p. 321.

In 1907 the author reported a case of infection with *Anthomyia canicularis* as the eighteenth on record at that time, five having been reported in America, five in Germany, and the remainder in England, France, Sweden and the Argentine.

He now reports another case, namely that of a woman, a native of Illinois. The condition seems to have begun 14 years ago with nausea and vomiting, larvae being passed in the stools some months after the commencement.

Two years ago constipation set in, this persisting till the present time in a chronic form. Under treatment, dram doses of magnesium sulphate before breakfast and at 4 p.m. with 5 grain doses of salol four times a day, some signs of improvement have appeared, but 4 to 50 larvae per day are still being passed. The author, however, believes that the prognosis is favourable. He refers to fatal cases reported by CACHANGE and to an interesting one mentioned by FINLAYSON of Glasgow. In this after protracted constipation and chronic pain in the back and sides the patient passed large numbers of Anthomyia larvae.

In most cases, however, no grave symptoms are seen as a result of the invasion of the intestinal tract by the larvae.

[The chronicity of the case described above requires explanation. It is difficult to understand how it could have gone on as long as 14 years. Perhaps the passage of the larvae had nothing to do with the symptoms, which seem mainly to have been uterine in nature.]

G. C. L.

MACGREGOR (Malcolm Evan). **The Posterior Stigmata of Dipterous Larvae as a Diagnostic Character: with Especial Reference to the Larvae incriminated in Cases of Myiasis.**—*Parasitology.* 1914. June. Vol. 7. No. 2. pp. 176–188. With 3 plates and 3 text figs.

The author believes that good diagnostic characters are required, both by entomologists and physicians, for identifying the different larvae which cause myiasis. Often, as he points out, rearing the adult fly is impossible owing to the fact that the material to be examined is dead. He therefore undertook a comparative study of the morphological characters of the posterior stigmata of some of the different larvae. The technique for making the examination is given in detail. The whole of the softer tissues is removed by boiling in potash so as to leave only the chitinous structures intact. The larvae are hardened in absolute alcohol for several days and are then sectioned by hand, without imbedding, with a keen microtome knife or a carefully sharpened

Gillette razor blade. A description of the stigmata as seen in *Lucilia caesar* Linn., *Cynomyia cadaverina* Desv., *Calliphora vomitoria* Linn., *Sarcophaga sarraceniae ?* Riley, *Chrysomyia* sp. *incert.*, *Musca domestica* Linn., *Stomoxys calcitrans* Linn., *Haematobia serrata* Desv., *Gastrophilus equi* Clark, and *Oestris ovis* Linn., is given. Three plates are appended.

Those interested should consult the original paper.

G. C. L.

HELMINTHIASIS.

FILARIASIS.

RINGENBACH (J.) & GUYOMARC'H. **La Filariose dans les Régions de la Nouvelle Frontière Congo-Cameron. Observations sur la Transmission de** ***Microfilaria diurna*** **et de** ***Microfilaria perstans.***—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 619–626.

Filaria bancrofti has been noted on the Congo in the region of Brazzaville, but owing to the fact that the natives objected to being disturbed at nights the authors could not determine its existence or otherwise in the regions traversed by themselves. Cases of elephantiasis were, however, seen: for example, between the sea and the Ivindo three in which the scrotum was affected and two the legs; between the Sangha and the Lobaye seventeen [variety not stated], ten in men and seven in women; and between the Lobaye and the Ouham four.

Filaria loa, as already noted by BRUMPT and OUZILLEAU, occurs in parts of the Congo. During the work of the Boundary Commission five examples of an adult *F. loa* in the eye were seen, three in natives of the same region (Pahouins), the fourth in a Loango porter, the fifth in a European, while in the South and East Kamerun sections five other Europeans showed Calabar swellings and erythema.

Filaria perstans was very common and was often associated with other filariae in the blood, the authors quoting OUZILLEAU as saying 30 times out of 100 in M'Bomou, and BRUMPT, 10 times out of 100 in Ouellé.

Onchocerca volvulus is also common.

As regards intermediate hosts the authors state that on the Gaboon and middle Congo a biting fly, designated by the Pahouins *Oseun*, is very common in the wet season. This is a Chrysops, *C. centurionis* Austen. In the blood in the stomach of such flies after sucking infected persons *Filaria loa* and *F. perstans* embryos were often found, but opportunities were wanting to carry out further researches to determine the evolution. LEIPER'S observations in Southern Nigeria are referred to, the statement being made that *C. dimidiata* and *C. longicornis* are the only known species of Chrysops in those parts.

[LEIPER worked with *C. dimidiata* and *C. silacea* and found that a rapid development of *F. loa* embryos took place in their salivary glands (see this *Bulletin*, Vol. 2, p. 196). He mentions *C. longicornis* as occurring there also, but could not get sufficient of these flies to work with. On epidemiological grounds the authors' *C. centurionis* must also now come under suspicion for *F. loa*, but there is no evidence that it, or any Chrysops, acts as a host for *F. perstans*.]

The endemic index for filariasis in the regions traversed is summarised in the following table:—

ENDEMIC INDEX OF FILARIASIS.

I. North of the Gaboon (from the sea to the Ivindo).

	Number of natives examined.	*F. perstans.*	*F. loa.*	*F perstans* + *F. loa.*	Total of natives filariated.	Percentage filariated.	Percentage of *F. perstans.*	Percentage of *F. loa.*	Percentage of *F. perstans* + *F. loa.*
Men	445	225	41	63	329	73·9	50·1	9·2	14·1
Women ..	294	163	21	48	232	78·9	55.4	7·1	10·7
Children ..	210	56	5	8	69	32·8	26·6	2·38	3·8
Total ..	949	444	67	119	630	—	—	—	—

II. From the Sangha to the Lobaye :

Natives examined,	Natives filariated,	per cent.
2,252	1,284	57·01

III. From the Lobaye to the Ouham :

Natives examined,	Natives filariated,	per cent.
376	165	43·88

[An analysis of these figures shows the great frequency of *F. perstans*. It is unfortunate that night blood could not be obtained as, with *F. bancrofti* included, the comparison would have gained greatly in value.]

G. C. L.

LEBER (A.). **Beiträge zur Klinik und Therapie der Filarienkrankheit in der Südsee.** [The Symptomatology and Treatment of Filariasis in the South Sea.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. July. Vol. 18. No. 13. pp. 454–463.

Sixty per cent. of the grown-up Samoan natives are affected with elephantoid swellings or are the subjects of filarial inflammations. The first manifestations of the disease very often show themselves about the time of puberty and the author quotes an example of "Mu-Mu" fever in a boy of twelve.

The local appearances of the attacks are as follows :—

(1) Lymphatic swellings : cubital, inguinal, axillary, cervical.

(2) Peripheral lymphangitis from the inflamed glands.

(3) Inflammatory oedema of the extremities with secondary gland swelling.

Haematochyluria was only seen once and orchitis is also uncommon amongst the natives, but it is seen more frequently in Chinese immigrants, in whom it may be the only symptom present. In the later stages of the disease abscesses, either superficial or deep in the muscles, are frequent. Associated with these, fibrous thickening of the surrounding tissue is common.

As regards treatment, in Mu-Mu fever antipyretics such as quinine, antifebrin and antipyrin are employed. For general treatment of the disease phenocoll was tried and a series of cases treated by the remedy is described.

In old cases with much fibrous thickening injections of fibrolysin into the diseased tissues were found to be of use.

G. C. L.

YOUNG (W. J.). **A Study of the Nitrogenous Metabolism in Chyluria.** —*Jl. Trop. Med. & Hyg.* 1914. Aug. 15. Vol. 17. No. 16. pp. 241–244.

The author, who writes from the Australian Institute of Tropical Medicine, Townsville, opens his paper with the statement that the condition of the urine in chyluria has hitherto been studied from the point of view of the fatty material which it contains, but that very little work has been done on the albuminous matter and other nitrogenous constituents. In 1913–14 two cases of chyluria were admitted to the tropical ward of the Townsville General Hospital and the opportunity was taken to examine the urines with regard to the distribution of nitrogen in them A history of the two cases is given. Both were cases of true chyluria, the urines always containing fat which could be extracted with ether, though the milky appearance could not be entirely removed in this way. An estimation of the quantity of fat in the urine was only made on one 24-hour sample in each case. The method employed was a modification of that devised by MEIG. The result of this analysis showed that the 24-hour sample of case 1 contained 1·8 per cent. of fat, while that of case 2 gave 2·6 per cent.

> "The protein nitrogen was determined by adding 20 cc. of a saturated solution of sodium chloride to 100 cc. of the urine contained in a 200 cc. measuring flask, making faintly acid with acetic acid and, coagulating the protein by immersing the flask in a bath of boiling water for 30 minutes.
>
> "The mixture was then cooled, made up to the mark with distilled water, filtered, and the unprecipitated nitrogen determined in an aliquot part of the clear filtrate by Kjeldahl. The difference between this non-protein nitrogen, calculated up to the original volume of the twenty-four hour urine, and the total nitrogen of the urine determined by Kjeldahl, corresponded to the nitrogen present as protein."

The other nitrogenous constituents were determined in the urine after removal of the protein, the urea by Folin's potassium acetate method, ammonia (Folin), uric acid (Folin-Schäfer), creatinine and creatine (Folin).

A series of tables shows the results of the various analyses. Filaria larvae could not be found in the peripheral blood, either during the day or during the night, but the author is of the opinion that the cases were filarial in origin.

The general protein metabolism was not apparently affected by the continued loss of lymph. In the first case the level of protein catabolized was very low, but the relative quantities of ammonia, uric acid and creatinine were in the same order as those in normal urines with similar protein levels of metabolism.

In the second case, when the diet was constant in amount and of normal protein content, the nitrogenous equilibrium was more than maintained

The quantity of chyle in the urine, as measured by the proteins excreted, was on the average the same whether the diet was free from fat or rich in fat. The quantity of proteins present in the urine, according to the author, is the best guide to the condition of the patient in chyluria, since these are the substances which clot to jelly-like masses and cause the difficulty of passing the urine which is so often complained of in those cases.

G. C. L.

DRACONTIASIS.

LISTON (W. Glen) & TURKHUD (D. A.). **Guinea-Worm Disease in an Indian Village.**—*Proc. Third All-India Sanitary Conference held at Lucknow Jan. 19–27*, 1914. Vol. 4. Papers. Suppl. to *Indian Jl. Med. Research.* pp. 120-123.

In one of the two wells of a village [unnamed] reported by the Civil Surgeon of Thana the authors found that 44 out of 114 cyclops contained young guinea-worms (*i.e.*, 38·6 per cent.) in the month of March 1913. There were sixty-two inhabited houses in the village with a population of 269 souls, 150 males and 119 females. During an epidemic of dracontiasis in the current year [1913] cases occurred in 20 houses amongst 29 persons, *i.e.*, 10.78 per cent. of the villagers. So far as could be gathered 98 persons out of the 269 inhabitants (*i.e.*, 38·68 per cent.) had been afflicted by the disease in past years; of these 43 per cent. were males, 26 per cent. females. Although the water is so scarce that the supply of each house is strictly limited during two or three months of the dry season, it is so little prized and protected that the men and boys have a common practice of swimming and bathing in the wells.

R. T. Leiper.

TURKHUD (D. A.). **The Distribution of Guinea-worm in India.**—*Proc. Third-India Sanitary Conference held at Lucknow, Jan. 19–27*, 1914. Vol. 4. Papers. Suppl. to *Indian Jl. Med. Research.* 1914. pp. 124–129. With a map.

Although dracontiasis is generally admitted to be widely distributed over the Indian Peninsula no reliable data are available to determine with any degree of accuracy the extent to which it is present in the different parts of the country. The only official figures are those recorded in the Annual Report of the Sanitary Commissioner in connection with the statistics pertaining to the Native Troops and Prisoners, and even here the figures for the troops are discontinued in 1908.

The whole of India has been divided, as shown in the map reproduced, into eleven geographical groups representing areas which are fairly

homogeneous so far as the chief prevailing diseases and climatic conditions are concerned, viz.:—

I. Burma Coast & Bay Islands.
II. Burma Inland.
III. Assam.
IV. Bengal & Orissa.
V. Gangetic Plain & Chutia-Nagpur.
VI. Upper Sub-Himalaya.
VII. North-West Frontier, Indus Valley & N.W. Rajputana.
VIII. S.E. Rajputana, Central India & Gujarat.
IX. Deccan.
X. Western Coast.
XI. Southern India.

These groups are divided into smaller sub-divisions, *e.g.*, A, B, C. H.S. indicates Hill Stations. The figures on the map give the mean ratio per annum per thousand prisoners. The reader will gather from the text of the paper how exceedingly misleading these statistics may be.

R. T. L.

PLAGUE.

van LOGHEM (J. J.) & SWELLENGREBEL (N. H.). **Kontinuierliche und metastatische Pestverbreitung.** [The Spread of Plague Continuous and Metastatic].—*Zeitschr. f. Hyg. -u. Infectionskr.* 1914. Vol. 77. May 27. No. 3. pp. 460–481. With 4 figures and 2 plates.

As far as Java is concerned only two kinds of rats need be considered in connection with the spread of plague—the house rat (*Mus griseiventer* Bonhote) and the small house rat (*Mus concolor* Blyth). These are both regarded as varieties of *Mus rattus*, and are described together as "house rats." They are distinguished from the field rat (*Mus diardii* Jentink) by the fact that with both varieties the tail is longer than the body, while the tail of the field rat is, like that of *Mus norvegicus*, shorter than the body. The field rat has never been known to carry plague infection in Java, and *Mus norvegicus*, which is found in isolated colonies near the coast and large rivers, is only infected with one-third the frequency of the house rat. The extreme mobility of the house rat, its predilection for human habitations, its large flea-count and high "blood-contact" all indicate its importance in the spread of plague. (The "blood-contact" is measured by the number of young rats found infected with *Trypanosoma lewisii.* It is taken as an index of the possibility of plague infection if introduced, spreading among the species. The percentage of trypanosome-infected house rats throughout the year was found to average about 30 per cent., while the percentage among field rats, during the same period, only averaged about 5 per cent.)

There are two separate and distinct methods of plague epizootic extension met with in Java. In the first (continuous method of spread) the progress of the disease is gradual but persistent, spreading slowly from house to house and from village to village. It is suggested that when the rat population of an infected house is decimated by plague, the area is then invaded by the rats belonging to a neighbouring community, which carry away with them plague infected fleas, and thus spread infection. It is difficult to demonstrate the spread of rat plague from village to village, but the authors have found plague-infected *Xenopsylla cheopis* on rats in villages where no case of human plague has occurred, clearly showing that the house rat carries plague from infected to non-infected districts.

The second method of plague dissemination is described as the metastatic or discontinuous method of spread. The epizootic suddenly appears simultaneously in several different centres, from which it spreads slowly. Observations in Java do not support the hypothesis advanced by the Indian Plague Commission that the infection is transmitted by human agency—infected fleas being carried in clothing or personal luggage, but rather all the facts point to the conclusion that the house rat is the almost invariable vector of the disease. This rat is a great traveller and is often found in vehicles used for the transport of food-stuffs (rice especially). At the commencement of the plague epizootic in Java, large numbers of dead house rats were found in the railway goods-waggons, and plague has been observed to spread along the lines of commercial, and not necessarily of human, intercourse.

An examination of the ecto-parasites found on the fumigated clothing and luggage of 56,790 natives on the borders of the infected Melang Department of Java revealed the presence of only three rat fleas. The investigation was conducted from 14th February to 15th May: the actual figures are very interesting and are here appended:—

2 *Xenopsylla cheopis,*
207 *Pulex irritans,*
1 *Pigiopsylla ahalae,*
9 *Ctenocephalus canis.*
1916 *Pediculus hominis,*
707 *Cimex rotundatus,*
6 Acarines,
1 Reduviid.

The conclusion arrived at is, in contradistinction to Indian experience, that human beings cannot be seriously considered as important factors in the spread of plague epizootics. This may be accounted for by the relatively lesser severity of the disease in Java, both among man and rats, and also by the much smaller flea counts on rats as compared with India.

R. St. John Brooks.

van Loghem (J. J.) & Swellengrebel (N. H.) **Zur Frage der Periodizität der Pest auf Java.** [The Periodicity of Plague in Java.]—*Zeitschr. f. Hyg. -u. Infectionskr.* 1914. June 24. Vol. 78. No. 1. pp. 131–150. With 7 figures.

In this paper, matters of considerable interest are discussed with reference to the irregularity of plague epidemics in Java and to the question of "regional immunity."

Plague made its appearance in Java in the Melang Department (1911) and almost at the same time the disease manifested itself in Surabaya, Kediri and Madiun. Surabaya was the probable point of entry, the disease being spread thence by the railway. From the examination of subsequent statistics it appears that the times of the year in which the epidemics commence and reach their height respectively, show great variations. The commencement of the various epidemics has taken place in April, May, June, September, October and December. The height of the epidemic (in Melang) has been reached in February, April, May, June, August and December. Indian experience has been very different, and a marked periodicity, indirectly dependent on climatological factors, has constantly been observed, the epidemic reaching its maximum in the cool and moist part of the year and dying away in the hot and dry season.

In Java, which possesses an equatorial climate, the dry season (east monsoon) lasts from May to September, while the rainy season (west monsoon) sets in in November and terminates in March. The temperature is fairly constant throughout the year, and even in the dry season the relative humidity is high (60 to 70 per cent.). The mean monthly temperature varies some two or three degrees but the fluctuations in the relative humidity are somewhat greater (17 per cent.). This fluctuation is, however, very slight in comparison with variations observed in British India (Poona 46 per cent.), and it is concluded that climatic influences can only play a very subsidiary role, if regarded as a factor in the intensity of plague epidemics in Java. Indeed in Melang, in the wettest months of the year 1912, very few cases of plague occurred, while the epidemic was very severe in the dryest period of the same year.

Investigations regarding the flea infestation of the rodent population were made in the usual way, and the number of fleas per rat was found to increase in the plague infected districts during epidemics, the fleas becoming more and more concentrated on the decreasing rat population. ("Secondary concentration.") This phenomenon was found to be quite independent of climatic conditions. In districts that remained practically free from plague (e.g. Ngantang) the number of fleas collected was very small (average 0·6). The fluctuations in the flea counts were found to be correlated with variations in the relative humidity, but were considered to be too small to have any significance in connection with the rise and fall of the epidemics.

Similarly, an investigation with regard to the numbers of pregnant female rats, made for the purpose of determining the increase and diminution in the number of young rats at different times of the year, revealed the fact that the fluctuations were very irregular and bore no relation to the variations in intensity of plague.

No satisfactory explanation can be given as to the regional immunity of Surabaya. The question is discussed from all the above points of view, but with the exception of the fact that *Mus norvegicus* is frequently found in Surabaya and is practically absent from the other points of observation, there are no noteworthy differences in conditions in Surabaya and elsewhere. The suggestion is thrown out that the relative immunity of this town may be due, possibly, to chance circumstances.

R. St. J. B.

HEISER (Victor G.). **Reappearance of Plague in the Philippines after an Absence of Six Years. Brief Description of the Outbreak, the Methods used to combat it, and the Probable Factors in its Introduction.**—*Philippine Jl. of Science.* Sect. B. Trop. Med. 1914. Feb. Vol. 9. No. 1. pp. 5–37. With 1 map.

With regard to this epidemic, the first case of human plague was reported on the 17th June 1912, and up to October 1913, 68 cases with 58 deaths had occurred in Manila, and 9 cases with 9 deaths in Iloilo. The disease was probably introduced by plague rats or infected fleas present in cargo from infected ports, which cargoes were not unpacked until distribution in the city. The plague infection among the rats was very low, being less than 0·002 per cent., and of the 48 infected rats that were trapped only one was at all sick, and only one was found to be dead of plague. The first case of human plague preceded the first recognised case of rat plague by more than two months Among the human cases one appears to have been of peculiar interest. After the death of the editor of the "Manila Daily Bulletin" from plague, a mummified plague rat was found in one of the drawers of his office desk, along with a number of plague-infected *Xenopsylla cheopis.* The rat had been dead for fully two weeks, and the assumption is that the fleas retained their powers of infection for at least that period.

In the course of their investigations, the sanitary authorities were able to confirm the statements made by workers in Java with regard to the nesting of rats in the hollow bamboos used in the erection of dwelling-houses. The sanitary methods used to eradicate the disease appear to have been very thorough, and new regulations have been formulated, including those providing for the proper rat proofing of new buildings.

With regard to the trapping of rats, the spring or snap trap was found to be ten times as effective as the wire cage trap, which latter was, however, more effective than poisoned bait.

R. St. J. B.

KUNHARDT (J. C. G.). **Further Investigations into the Persistence of Plague Infection in the Villages of Poona District during the Off-Season.**—*Proc. Third All-India Sanitary Conference held in Lucknow, January* 17-27, 1914. Vol. 5. Papers Suppl. to *Indian Jl. Med. Research.* pp. 116–125. With 4 charts.

In his previous paper on this subject [this *Bulletin*, Vol. 4, p. 15], Kunhardt assumed tentatively that a list comprising all the villages in the Poona district which returned plague cases during the first three months of the plague season (July, August and September), as well as any of the six months which precede that period, would include most of them that carried plague over the off-season. In order to complete this investigation, the records of the plague Progress Reports of the Government of Bombay were investigated and the subsequent history of all villages infected during any two years was examined. Only villages with a population of over 300 were considered.

As the result of these investigations it is concluded :—Epidemics of village plague are almost all limited to one plague season. Rare instances of overlapping occur in villages infected late in the plague season, but if plague terminates by December, the disease does not carry over into the next season. (Poona is a notable exception to this rule A large town like Poona resembles in its behaviour a group of villages and various portions become infected in turn, and thus there is but little dfficulty in the disease surviving the off-season.) No case of plague that cannot be explained on the grounds of re-importation occurs during the second plague season after the month of September. "All places which show plague cases in the first three months of the plague season, as well as in any of the previous six months, would, under normal conditions, include most of those that carry plague infection over the intervening off-season; the few exceptions being those places which, infected either immediately previous to or during the off-season, do not for various reasons, return human cases or deaths till the following plague season has commenced."

R. St. J. B.

EAST AFRICA PROTECTORATE. **Annual Report for the Year ending 31st December 1913.** (1914.) pp. 68-90. **Report on the Outbreak of Plague in Mombasa, for the Year September 1912-1913.**

During the period under consideration 203 cases of plague, with 177 deaths, occurred in Mombasa. Of these, 33 cases were pneumonic in origin. The report gives full details of the course of the epidemic and of the sanitary and preventive measures taken by the Medical Staff to get the disease under control. Rat collection and examination was only undertaken with great difficulty, on account of passive and active opposition from the inhabitants, and only a very small percentage of the rats collected were found to be infected. The employment of Clayton gas in the disinfection of houses was very successful. The bulk of the population of the town was inoculated with Haffkine's prophylactic; out of a consecutive series of 224, plague occurred in 20 persons or in 8·9 per cent. of the total. During the whole period the case mortality among the inoculated was 80 per cent.; among the uninoculated 87 per cent.

R. St. J. B.

FRANCISCO TELLO (J.) & RUIZ FALCÓ (Antonio). **La Peste Bubónica en la Zona de Influencia Española en Marruecos.** [Bubonic Plague in the Zone of Spanish Influence in Morocco.]—*Bol. Inst. Nac. de Alfonso XIII.* 1914. June. Vol. 10. No. 38. pp. 97-143. With 2 plates, 3 plans and 1 curve.

The authors deal in this communication with two small outbreaks of plague which occurred in the zone of Spanish influence in Morocco, at the military camps situated at Alcazar and Larache respectively.

The epidemic started at Alcazar on September 13th, 1913, and in all 76 cases of plague occurred, with the low mortality of 26 per cent.; 53 of these cases were clinically examined and were found to be of the bubonic type, with the exception of one septicaemic case.

In Larache 22 cases were reported; 12 of the 14 observed cases being bubonic. 13 cases occurred among Spaniards with a 15 per cent. mortality and 9 among Moors with an 89 per cent. mortality. This striking difference in the death rate is not attributed to any immunity on the part of the Spanish population but rather to the conditions of life under which the Moors exist and to the lack of proper medical assistance in their communities.

The sanitary and other measures taken by the Spanish civil and military authorities to limit and finally to stamp out the epidemics are given in considerable detail, and a comparison between the French and Spanish sanitary administrations in Morocco is made, greatly to the detriment of the latter.

R. St. J. B.

AGRAMONTE (Aristides). **The Late Outbreak of Plague in Havana.**—*Amer. Jl. of Trop. Dis. & Prevent. Med.* 1914. July. Vol. 2. No. 1. pp. 13–27. With 1 plate.

Nineteen cases of bubonic plague, with three deaths, have occurred in Cuba since the 24th February 1914. With one exception these cases were reported from the City of Havana. It is of interest to observe that the disease was confined to the male population and that the great majority of the patients (13) were Spaniards, and not native Cubans.

In the routine sanitary measures adopted to stamp out the epidemic, sulphur fumigation was employed (4 to 5 pounds of sulphur per 1,000 cubic feet), but it was soon found by means of test guinea-pigs that this method of fumigation was not satisfactory, as rats harbouring infected fleas could, by retreating into the depths of their burrows, escape from the lethal influence of the gas, and thus remain as a source of danger to the inhabitants. Subsequently hydrocyanic acid gas (obtained by the action of dilute sulphuric acid on 10 to 15 grains of cyanide of potash for every 10 cubic metres space) was used with satisfactory results. Agramonte does not consider the use of this gas to be very dangerous provided proper precautions are employed but, on account of its rapid powers of diffusion, careful preparation of the buildings intended for fumigation is necessary.

R. St. J. B.

WADE (H. Windsor) & STARLING (Houston L.). **A Study of the Early Cases of Bubonic Plague in New Orleans,**—*New Orleans Med. & Surg. Jl.* 1914. Aug. Vol. 67. No. 2. pp. 95–105.

Although rat plague occurred in New Orleans in 1912, bubonic plague infection of man did not make its appearance until the month of June, 1914. It is possible that the infection had remained latent in the rodent population for a period of two years.

This paper gives a detailed description of the clinical history of some of the earlier cases observed.

R. St. J. B.

STRICKLAND (C.). **The Incidence of Plague in Europe, with Special Reference to the Rôle played by the Rat.**—*Lancet.* 1914. Nov. 14. pp. 1141–1143. With a diagram.

The opinion is here expressed that the comparative disappearance of plague from England is associated with charges in the rat fauna of the country; the domesticated black rat (*Mus rattus*) being replaced by a wilder and more scattered species (*Mus decumanus*). It is pointed out that, while an 8 per cent. epizootic of plague in India may lead to a devastating epidemic, an 11 per cent. epizootic in East Anglia did not affect the human population.

In considering plague epizootics in England, the author does not think that the flea-rate bears any relation to the intensity of the epizootic, and points out that in East Anglia, while a flea-rate of 1 was associated with a plague epizootic of 11 per cent. in the winter of 1910, in the summer-autumn of 1911, when the flea-rate was 4·5, the infection rate among rats was only 0·2 per cent. In consequence, the rise and fall of the epizootic must be attributed to other factors, such as lessened density of the rat population during the summer months.

[No account is, however, taken of the very different circumstances in which the two investigations were conducted. In the former investigation the percentage figure was obtained from the examination of 123 rats which came to hand in specially selected areas in which epizootic plague was either suspected or known to exist, while in the latter investigation some 15,000 rats from over 200 parishes were examined and in only 19 cases were such parishes found to be infected. As soon as plague was diagnosed, the supplies of rats from the parish in question were immediately stopped and thus the figure 0·2 per cent. does not give any index of the percentage of infection in the infected areas.]

R. St. J. B.

SWELLENGREBEL (N. H.) & OTTEN (L.). **Experimentelle Beiträge zur Kenntnis der Uebertragung der Pest durch Flöhe und Läuse.** [Experimental Contributions to the Knowledge of Plague Transmission by Fleas and Lice.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1914. July 25. Vol. 74. No. 7 pp. 592–603. With 1 text fig.

The results of these experiments agree in many particulars with the conclusions of the Indian Plague Commission regarding the carrying over of plague infection by fleas. The authors have found that infected fleas (*Xenopsylla cheopis*), after so long a period as 33 days, are still capable of transmitting infection to rats and guinea-pigs. As far as Java is concerned, however, climatological circumstances (temperature, humidity, &c.) influence the capacity of the flea to transmit infection only to a very slight degree.

Fleas infested with mites (*? Anoetus*) do not readily transmit infection. An explanation of this curious phenomenon may be gathered from the fact that the mites are often present on the pricker of the flea, and so interfere with the mechanism of blood sucking and hence with plague transmission.

The authors are of opinion that the infection is not transmitted by means of the faeces of the flea being inoculated into the bites, by scratching or otherwise, as they took scrupulous care in their experiments to avoid faecal contamination of the bites. [See in this connection the paper by BACOT and MARTIN on the Transmission of Plague by Fleas, reviewed in this *Bulletin*, Vol. 3. p 201].

Experiments conducted with *Pygiopsylla ahalae* were also positive; fleas being observed to be infected up to the 18th day. Successful carrying over experiments were also conducted with lice ("*Pediculus hominis*") segregated from the clothing of plague-infected persons, thus showing that these insects may also be regarded as porters of plague infection. A few transmission experiments were conducted with bugs (*Cimex rotundatus*), but the results obtained were in every case negative.

R. St.J. B.

MISSIROLI (Alberto). **La Reazione della Termoprecipitina nella Diagnosi della Peste.** [The Thermoprecipitin Reaction in the Diagnosis of Plague.]—*Pathologica.* 1914. July 1. Vol. 6. No. 136. pp. 331–332.

The author has found the thermoprecipitin reaction described by ASCOLI in his book ("La Termoprecipitine", 1914) very useful as an auxiliary means of diagnosis in plague.

The dried serum employed for the test was obtained from the Pasteur Institute in Paris, the horses having been immunized first with dead and then with living plague bacilli. A gramme of the dried serum was dissolved in 10 cc. of physiological salt solution, and the solution was then filtered through asbestos wool under pressure until it was perfectly clear. The precipitinogen was obtained from the enlarged axillary or inguinal glands of five patients who died in an outbreak of plague in Tripoli, and also from the spleen of a child who died suddenly in the same isolation camp without presenting buboes. Numerous plague bacilli were detected microscopically in smears from the glands, and were recovered culturally from the spleen. The material was allowed to putrefy for from 30 to 40 days, until reduced to a state of pulp, and was then extracted with ten times its weight of salt solution, the filtrate being then maintained at boiling point for from 5 to 15 minutes, and afterwards filtered until clear through asbestos wool under pressure. One cc. of this solution was then floated on the top of an equal quantity of the serum solution in a test tube by means of a pipette, the result showing itself in a uniform turbidity, or a ring formed at the junction of the two solutions, according to the amount of active substance present. The usual controls were made with normal horse serum and normal glands. The experiment was afterwards repeated with the spleens of rats experimentally infected with plague, with equal success.

In outbreaks of plague of a doubtful nature, the author thinks that this method is a useful auxiliary to diagnosis. [Though the author does not distinctly say so, it may be presumed that in such a case the tedious process of putrefaction is to be omitted.]

J. B. Nias.

WARNER (Charlotte E.). **The Thermoprecipitin Method in the Diagnosis of Bubonic Plague in Cadavers.**—*Jl. of Hygiene.* 1914. Nov. Vol. 14. No. 3. pp 360–370.

The "Thermoprecipitin Method," devised by ASCOLI for the diagnosis of anthrax in cattle, can be applied with certain limitations to the diagnosis of plague in rat cadavers. The method is said to be of peculiar advantage in dealing with decomposed carcases in which the ordinary methods of diagnosis are difficult to apply, and where a prompt diagnosis is required. The intensity of the reaction depends on the number of bacteria present in the tissues used in the preparation of the tissue extract, and a positive reaction accompanied by satisfactory controls is regarded as absolute proof of plague infection. A negative reaction, on the other hand, is of no value, as the tissues, though from a plague cadaver, may have contained too few bacilli to induce a definite reaction. Because of this last fact, the precipitation test can never replace the usual bacteriological methods.

R. St. J. B.

DENMAN (Robert). **Electrargol in Small-Pox and Plague.**—*Brit. Med. Jl.* 1914. June 6. p. 1236.

The treatment of bubonic plague (in Mauritius) with intravenous injections of Electrargol (up to 60 cc.) is here recommended. The only cases, however, which appear to benefit by the treatment are bubonic cases in the early stages—up to 48 hours; the course of abubonic [septicaemic] and pneumonic plague not being affected.

Forty-eight cases were under treatment and gave a mortality of 60·4 per cent., as against an untreated series of 313 with an 83·4 per cent. mortality. [The former series does not appear to be large enough to allow any definite conclusion to be drawn in favour of the treatment advised.]

R. St. J. B.

Devy. **Notes sur l'Emploi à Pnôm-Penh de la Lymphe de Haffkine en Vue de la Prophylaxie de la Peste en 1910.**—*Ann. d'Hyg. et Méd. Colon.* 1914. Apr.-May-June. Vol. 17. No. 2. pp. 417–445.

The employment of Haffkine's prophylactic at Pnôm-Penh (Cambodia) has, on the whole, given very satisfactory results, but from experience gathered during the investigations, it appears that the age of the vaccine is of very great importance, both with regards to the local and constitutional reaction and to the immunity subsequently incurred. The prophylactic used in Pnôm-Penh was prepared at the Pasteur Institute at Saïgon. Vaccines four to six months old were found to be the most satisfactory; the reaction being very slight and the subsequent immunity extremely good. 983 persons were vaccinated with a vaccine of this order, in 1 cc. doses. None of these subsequently contracted plague, in spite of the fact that many of them were in intimate contact with plague cases. With freshly prepared vaccine, on the contrary, the results were most unsatisfactory, as the patients suffered, some more, some less, with distressing local and constitutional symptoms (lymphangitis, headache, malaise, &c.). The immunity conferred by this vaccine, moreover, compared unfavourably with the older preparation. [The reduction in toxicity in the older vaccine was probably due to the autolysis of the toxic nucleo-protein contained in the bacilli, brought about by enzyme action.] The author recommends giving the prophylactic as a single injection, instead of dividing the dose, as suggested by Haffkine himself. The mortality observed in the protected cases at Pnôm-Penh only amounted to 0·14 per cent.

R. St. J. B.

Abbatucci. **Notes sur les Accidents observés à la Suite d'Injections Préventives de Sérum Antipesteux de Yersin.**—*Ann. d'Hyg. et Méd. Colon.* 1914. Apr.-May-June. Vol. 17. No. 2. pp. 446–449.

Sixty-five preventive inoculations were carried out on persons dwelling in the neighbourhood of plague houses. [It is not definitely stated where this took place but, presumably, it was in Indo-China.] The anti-plague serum employed was prepared at the Pasteur Institute at Nha-Trang, and was at first given in 10 cc. doses subcutaneously. This dose was subsequently reduced to 5 cc. on account of the appearance of severe reactions with the larger dose. In all the cases in which a clinical history was obtained a distinct febrile reaction was observed, often accompanied with urticaria, lymphatic swellings, lumbago, giddiness and a sensation of heaviness in the extremities. With children, who were given proportionate doses, the reaction was slight or entirely absent.

The reaction could not be considered as anaphylactic, as some of the patients had never been previously inoculated, and the author attributes the condition to "the conflict of an antibody and an incompletely eliminated antigen."

R. St. J. B.

KUNHARDT (J. C. G.). **Plague Prophylactic Measures during the Off-Season.**—*Proc. Third All-India Sanitary Conference held at Lucknow Jan. 19–27.* 1914. Vol. 5. Papers. Suppl. to *Indian Jl. Med. Research.* pp. 126–157.

In this communication, Kunhardt discusses the possibility of the complete eradication of plague from certain districts in India.

The conclusions he arrives at apply, in the first instance, to that portion of the Deccan covered by the four districts, Poona, Ahmednagar, Sholapur and Satara. In former years, when the area in question was extensively infected, it was not to be expected that eradicative, as distinguished from palliative measures would meet with much success, but now with the steadily decreasing intensity of plague epidemics, it is to be hoped that the complete eradication of the disease from extensive areas will prove less and less difficult.

The method advocated consists essentially in rat destruction carried out in a rational and systematic manner during the off-season in those villages in which, from previous experience [see this *Bulletin*, Vol. 4, p. 15], the disease might reasonably be expected to carry over the off-season. From this point of view all villages were charted which showed the presence of plague infection late in the particular plague season under review. Similar figures were then entered for the previous December, in order to indicate which villages were infected for the first time only in January. The charts were carefully studied and the villages considered in turn with regard to local conditions, population, duration of epidemic, &c. The villages were then classified into four groups, viz.:—

Villages which required immediate rat reduction operations:—

(*a*) Where plague is almost certain to survive the off-season.
(*b*) Where plague will probably survive the off-season.

Villages which necessitated more or less careful observation or enquiry:—

(*c*) Where there is a possibility of plague carrying over.
(*d*) Villages which are almost certain to be plague-free.

The conclusions arrived at were checked from the previous plague histories of the villages in question.

By proceeding on these lines it is possible to concentrate attention on those foci of infection in which a properly directed campaign of rat destruction, accompanied by other appropriate measures, would be the most likely to lead to the eradication of plague from the district as a whole.

R. St. J. B.

BROWNING-SMITH (S.). **Rat Destruction and Plague.**—*Proc. Third All-India Sanitary Conference held at Lucknow Jan. 19–27.* 1914. Vol. 5. Papers. Suppl. to *Indian Jl. Med. Research.* pp. 158–161.

The importance of the temporary reduction in the rat population by means of rat destruction is here insisted on, and the best means for carrying such a campaign into effect is discussed. The simplest and most rapid method of reducing the rat population is by poisoning, and if properly carried out an immediate reduction of 80 per cent. should be effected. A cheap and effective bait can be made from phosphorus dissolved in carbon bi-sulphide and then added to warm *ghi*; this oily solution is then added to and incorporated with a stiff paste of *atta*, sugar and water in a special mixing machine. Flavouring substances are also added to make the baits attractive. A twelve ounce tin costing about ten annas is sufficient for 1,500 baits.

In two contiguous areas known to be equally susceptible to infection, in a year when plague was universally distributed, a comparison between ratted and non-ratted areas is very instructive. In the ratted area out of 154 villages 75, or about 50 per cent., remained free from infection, whereas in the non-ratted area out of 86 villages not one escaped infection.

It is recognised that rat destruction *per se* does not get to the root of the problem, and that the freedom of a rat infested district from plague is fundamentally a matter of rat-proofing and protection of food. As far as India is concerned, such measures are questions of generations of sanitary progress. Meanwhile rat destruction, which shows signs of falling into undeserved disrepute, ought to be stimulated by every possible means.

R. St. J. B.

LONG (J. D.). **Plague Eradication in California. Present Situation. The Disease apparently eradicated.**—*U.S. Public Health Rep.* 1914. Nov. 20. Vol. 29. No. 47. pp. 3103–3107.

Plague was first reported in California in 1900, and cases appeared from time to time till 1904. No cases were reported from 1904 till 1907, when the disease again became manifest. From August 1907, till January 1908, 159 human cases occurred. In August 1908, it was first discovered that the ground squirrels, which infest the rural districts of California, were extensively infected with the disease, and since that time a very vigorous campaign of "decitellization" has been carried on by the United States Public Health Service, working in conjunction with the Local Authorities.

The results of these operations have led to such a reduction of the squirrel population that plague can no longer be discovered, and for all practical purposes it may be said that the epizootic has been completely eradicated from the State. In infected districts intensive hunting has been conducted to such good purpose that upwards of 90 per cent. of the entire squirrel population has been exterminated. Hunting will again be resumed at the commencement of the next breeding season, and if no infection is then discovered, the statement may be made with certainty that no plague exists in the State of California.

R. St. J. B.

MACALISTER (G. H.) & BROOKS (R. St. John). **Report upon the Post-Mortem Examination of Rats at Ipswich.**—*Jl. of Hygiene.* 1914. Nov. Vol. 14. No. 3. pp. 316–330.

Over 15,000 rats were examined by the authors in 1911 on behalf of the Local Government Board. They were nearly all of the *Mus decumanus* species. The object of the enquiry was to ascertain the extent of plague infection in the rat population of the district. Of the total number of rats examined 35 were proved by inoculation to be infected; 116 rats suspected of plague were shown by inoculation not to be so infected.

In the examinations special, naked eye, observation was directed to lymphatic glands, haemorrhages, effusions into serous cavities, the condition of the liver, spleen and subcutaneous tissue, and where necessary microscopic examination was further resorted to.

The features of greatest service in the diagnosis of plague were the presence of subcutaneous congestion, clear pleural effusion and granular necrotic changes in the liver. All three signs were present in most of the positive cases but only in nine of the large number of negative cases. These signs taken alone are not of such great value as when taken collectively.

Gaertner infections were found in 19 rats and in these cases the liver was not granular but rather peppered with white spots.

Trypanosomiasis was found in 50 rats out of 2,000 examined in the month of August. The condition appeared pre-eminently associated with a blood stained pleural exudate.

Difficulties occasionally arose in the microscopic identification of the plague bacilli, owing to the presence in the organs of intestinal and putrefactive organisms which frequently show similar staining reactions.

W. J. Penfold.

EASTWOOD (A.) & GRIFFITH (F.). **Report to the Local Government Board on an Enquiry into Rat Plague in East Anglia during the Period July-October, 1911.**—*Jl. of Hygiene.* 1914. Nov. Vol. 10. No. 3. pp. 285–315. With a map.

This report deals with an inquiry, instituted by the Local Government Board some three years ago, into the localisation of rat plague in East Anglia. Epizootic plague had made its appearance in the locality in the summer of 1910, and a delimiting investigation, taking in a belt of country surrounding the known infected area, had been undertaken in the early part of the year 1911. The results of this investigation were negative. It was accordingly decided to prosecute enquiries principally in those districts which had been known by previous experience to be plague infected, and to this end an extensive campaign was organised for the collection of material for examination at the local Laboratory at Ipswich and also at the Local Government Board Pathological Laboratories in London. The investigation commenced in July 1911 with the examination of rats from the Borough of Ipswich, Sanford and Woodbridge R.D., Woodbridge U.D., and Felixstowe and Walton. In the latter part of July six plague infected rats were collected in these areas. The scope of the inquiry was then extended so as to comprise a large field in East Suffolk, a small part of West Suffolk and a strip of Essex adjacent to the south of Suffolk. During the months July-October 1911, 15,332 rats were examined, and as the result of the enquiry, 27 farms and other premises were found to harbour plague infected rats; all the infected foci being within the area previously known to be infected. As soon as a parish was found to be infected the supply of rats was immediately stopped, [so that the number of plague rats actually found (35) gives no indication of the intensity of the epizootic during the period under consideration.]

[The results of this investigation tend to show that although rat plague appears to have become firmly established in East Anglia, the epizootic had not, at this time, shown any tendency to extend into previously non-infected areas.]

R. St. J. B.

MARKL (Jaromir Gottlieb). **Zur Frage der Mutation bei Pestbacillen.** [The Mutation of Plague Bacilli.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1914. July 25. Vol. 74. No. 7. pp. 529–540. With 10 text figures.

The original cultures used in these experiments were obtained from four weeks' old agar plates which had been inoculated from buboes, blood and spleen from cases of human and rat plague. On examination of this material, three different kinds of plague colonies were observed, which are designated by the author as Types A, B and C respectively. The Type A colonies are described as extremely delicate, translucent, colourless, coarsely granulated colonies with strongly scalloped edges. They were adherent to the culture medium and did not exhibit the typical slimy and stringy conditions so frequently met with by plague workers. Type B were large colonies with slimy, yellowish centres standing out in bold relief, with bluish transparent indented edges. Type C were small, roundish dew-drop like, opaque colonies, without border. Types B and C correspond with Types I and II, previously described by ALBRECHT and GHON.

The A-strain represents the youngest form of colony, as it is in evidence during the first 24 hours on all cultures; the other types originate from the A colonies, either directly or through intermediate forms. These types do not, as a rule, exhibit hereditary constancy, and cannot therefore be described as true mutations.

It is concluded that the B and C forms are called into being by adverse conditions of growth (drying or exhaustion of media, toxins &c.), and may be regarded as conservative forms awakened by the needs of race preservation. This point is emphasized by the fact that the B and C forms originate spontaneously on pest inoculated culture media to which plague toxin has been added previously, while the control plates (without toxin) exhibit A colonies which change over into B and C colonies after a variable period.

Of the three races the A race is the most virulent. Three series of mice were inoculated with 24 hour broth cultures of the three strains (1:10, 1:100 and 1:1000 oese). The animals all died within three days, but while the bacilli recovered from the blood of the mice inoculated with the B and C strains were very scanty, the A-strain mice revealed the presence of a heavy septicaemia.

Morphological differences were also observed. The B and C strains cannot be thus differentiated, as they both appear as coccibacilli, but the A race organisms are longer, ovoid and uniformly staining. When introduced into the animal body the B and C strains become elongated and take on the morphological characteristics of the A-strain.

R. St. J. B.

WILSON (Robert J.). **The Viability of the *B. pestis* in Stock Cultures.** *Collected Studies from the Bureau of Laboratories, Dept. of Health, City of New York,* 1912–13. Vol. 7. p. 109.

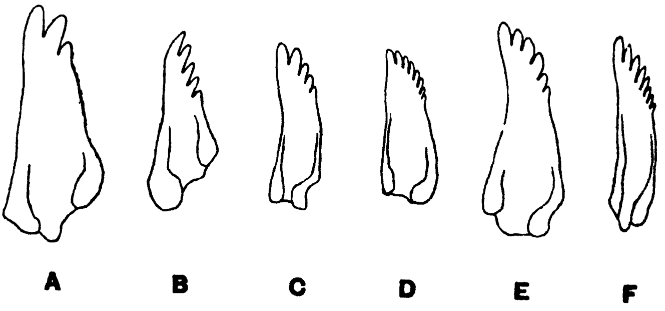
Plague cultures kept for a period of ten years and five months were examined and, on subculturing, an abundant growth of *B. pestis* was obtained after 48 hours. These organisms proved fatal to guinea-pigs in two days, and pure cultures were recovered from the heart blood.

R. St. J. B.

BACOT (A. W.) & RIDEWOOD (W. G.). **Observations on the Larvae of Fleas.**—*Parasitology.* 1914. June. Vol. 7. No. 2. pp. 157–175. With 6 text-figs.

The above paper forms a valuable contribution to the scanty literature on the larvae of Pulicid fleas. Much new ground is broken, and for the first time the differential morphology of the larvae of the more mportant species is placed on record.

Eggs laid by the female flea take from three to ten days to hatch out, according to temperature [see this *Bulletin,* Vol. 3, p. 204], and the resulting larvae after two moults, spin cocoons in which they pass a quiescent period prior to pupation. The authors call attention to the fact that the newly hatched larvae possess a curious chitinised appendage (egg-breaker) by means of which the grub slits open the egg-shell at the end of the incubation period; after the first moult this appendage disappears. The chief food supply of the larvae of fleas appears to be the excreta of their parents; one species, indeed, (*Ceratophyllus fasciatus*) requires such excreta for satisfactory growth in captivity. Other larvae, however, can subsist on dry organic fragments.



Mandibles of Larvae of Fleas (× 300). W.G.R. *A. Pulex irritans; B. Xenopsylla cheopis; C. Ctenocephalus canis; D. Ceratophyllus fasciatus; E. Ceratophyllus gallinae; F. Leptopsylla musculi.* All drawn by camera lucida with apochromatic objective 4 mm. and compensating ocular No. 4, and subsequently reduced to three-fourths; it is to be noted, however, that in different full-grown larvae of the same species the mandibles vary considerably in size.

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The morphological characters of the six species dealt with are quite distinctive, the principal points of differentiation being the structure of the first maxillary palps, the character of the terminal somites, the shape of the head and the number of teeth on the mandible. Some of the more important of these characters are summarised in the following table :--

Species.	1st Maxillary palp.	Anal struts of terminal somites.	Snout as viewed from above.	Number of teeth on mandible.
Pulex irritans	Type A.	Thin, curved, tapering ..	Medium	3
Xenopsylla cheopis ..	,,	As *P. irritans*, but blunter	Narrow	5
Ctenocephalus canis ..	,,	As *P. irritans*, but smaller	Medium	6
Ceratophyllus fasciatus...	Type B.	Thick, straight, slightly tapering, blunt end ..	Broad	8
Ceratophyllus gallinae ..	,,	As *C. fasciatus*	,,	6
Leptopsylla musculi ..	,,	As *C. fasciatus*, but smaller	,,	8

Type A. Basal joint short and broad; second joint narrow at base and obliquely truncated.

Type B. Basal joint cylindrical, twice as long as broad; second joint cylindrical and rounded at extremity.

Six figures appear in the text emphasizing the variations in structure met with in the different species under consideration.

R. St. J. B.

SWELLENGREBEL (N. H.). **Versuche und Beobachtungen über die Biologie von *Xenopsylla cheopis* in Ost-Java.** [The Biology of *X. cheopis* in East Java.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1914. July 16. Vol. 74. No. 5/6. pp. 456-466. With 2 text figs.

In this paper are collected together the results of the author's observations on the biology of *Xenopsylla cheopis* in East Java. In some particulars they differ from the findings of the Indian Plague Commission, notably in respect to the length of time that elapses before a fasting flea will bite man. In his experiments, which were conducted with caged rats and guinea-pigs, within a dwelling-house with a concreted floor, it was found that man was readily attacked on the first day of fasting. Under the same conditions as obtained in the investigations by the Indian Plague Commission, where large numbers of fleas were collected in test-tubes and subsequently allowed to feed on the human arm, it was found that similar results were obtained, *i.e.*, the fleas did not bite freely till the third day of fasting. In Surabaya the life of a flea away from its host appears to be much shorter than in other situations in East Java.

With regard to the different stages of development of the flea, it was ascertained that the time period of egg incubation was significantly influenced by the hygrometric state of the atmosphere. Other things being equal, the greater the percentage saturation, the greater the percentage of eggs that hatched out. Attention is drawn to the fact that in Surabaya an unfavourable influence exists which is inimical to the development of the larvae of *X. cheopis*. This unfavourable influence is dependent on an unknown factor, which cannot be explained on the grounds of temperature or relative humidity.

R. St. J. B.

Van Driel (D. M.). **Naar Aanleiding van "Pestbestrijding te Shanghai en Pestbestrijding op Java" door Dr. O. L. E. de Raadt.** [Remarks induced by "Anti-plague Measures in Java and Shanghai" by Dr. de Raadt.]—*Geneesk Tijdschr. v. Nederl.-Indië.* 1914. Vol. 54. Pt. 3. pp. 338–345.

Van Driel in this communication, in reference to certain criticisms by de Raadt [see this *Bulletin*, Vol. 4, p. 25], states that while he is in agreement with the author as to the great importance of epidemiological factors in the combating of plague epidemics, he is of opinion that the practical side of the question has been overlooked in Java, and to a certain extent in Shanghai.

He contends that Public Health services might well limit themselves to investigation based upon firmly established principles, without personally engaging in the study of more or less "academic and theoretical questions." R. St. J. B.

MALARIA.

Ross (Ronald). **The Huxley Lecture on Recent Advances in Science and their Bearing on Medicine and Surgery. Malaria and the Transmission of Diseases.**—*Lancet.* 1914. Nov. 7. pp. 1079–1084.

In this lecture Sir Ronald Ross, after some general remarks on the transmission of disease and a reference to early investigations and later discoveries, turns to the subject of malaria. He quotes statistics to show that as a broad general rule in malarious countries about one-third of the total population suffers from attacks every year, and that about one-third of the admissions to hospital and attendances at dispensaries is due to malaria. There is, however, an enormous additional number of patients who remain untreated, as is evident from a consideration of the spleen rate of native children which in very unhealthy regions may be 100 per cent. Economically as well as medically malaria is certainly the most important disease in the tropics, perhaps in the world, though the case mortality is only about 0·5 per cent. It is, however, so prevalent that the total mortality which it causes amounts to anything from 10 to 15 per 1,000, while it complicates other maladies and makes them more difficult to treat. In India alone during ordinary years the total deaths from malaria average 1,300,000 annually.

Ross then considers the old views as to the etiology of the disease and traces the development of what, until comparatively recent times, was only the mosquito theory. [In this connection the name of BEAUPERTHUY might have been given honourable mention, for his work was at least as meritorious as that of KING, and he wrote long before the latter.]

The author then deals with his own historic work which converted theory to fact and, as he points out, paved the way for advances in other directions. He concludes by expressing disappointment with the paucity of the efforts which have been made to take full advantage of his discovery, although he admits that in certain places much has been accomplished, an earnest of benefits to come.

A. Balfour.

GILL (Clifford A.). **Epidemic or Fulminant Malaria together with a Preliminary Study of the Part played by Immunity in Malaria.**—*Indian Jl. Med. Research.* 1914. July. Vol. 2. No. 1. pp. 268–314. With 3 maps and 3 charts.

This long and valuable paper is best summarised by quoting the author's tabular statement of conclusions grouped under six headings. These are as follows:—

" (A).—*General.*

" (1) Endemic malaria may be divided into (*a*) Tropical malaria; (*b*) Sub-tropical malaria.

" (2) Malaria may manifest itself in epidemic form as (*a*) Fulminant malaria; (*b*) Generalised epidemic malaria; (*c*) Localised epidemic malaria.

"(3) Fulminant malaria is ordinarily a manifestation of sub-tropical malaria.

"(4) The principle underlying the occurrence of these various manifestations of malaria is closely related to the subject of immunity.

"(B).—*Malarial Immunity.*

"(5) Immunity in malaria appears ordinarily to be an acquired partial immunity which manifests itself as a relative tolerance to the effects of malarial infection.

"(6) Whilst the protection afforded by a single infection is slight and not long maintained in the absence of reinfection, a high degree of tolerance to malarial infection is brought about as the result of *repeated inoculation* with fresh parasites.

"(7) In circumstances where perennial infection may occur the collective immunity of a community tends ordinarily to remain fairly constant, whilst it is subject to marked fluctuations in localities where the transmission of infection remains in abeyance over prolonged periods.

"(8) All epidemic manifestations of malaria are ultimately dependent upon 'equilibrium' between the degree of immunity and the amount of infection being temporarily disturbed or lost.

"(9) The spleen-rate of a community may be utilised as an index of the tolerance to malaria possessed by that community; a spleen-rate remaining constant over a period of years ordinarily signifies a constant immunity,. whilst a fluctuating spleen-rate implies corresponding oscillations in the degree of immunity possessed by the community.

"(C).—*Tropical Malaria.*

"(10). Tropical malaria is associated with conditions which render possible the transmission of fresh malarial infection almost throughout the whole year. In such circumstances tolerance to infection remains fairly constant and there is little or no tendency for pernicious forms of malaria or for fulminant epidemics to occur *amongst the indigenous inhabitants.*

"(11) The spleen-rate of such communities ordinarily remains fairly constant and, in addition to affording evidence of the endemic prevalence of the disease, its constancy over a period of years indicates that the immunity of the community likewise remains fairly constant.

"(12) Generalised or localised epidemics of malaria may occur in tropical countries as the result of conditions causing a marked temporary increase in the amount of local infection.

"(13) An epidemic of a fulminant nature may follow the introduction of malaria into non-endemic tropical areas, but such epidemics may not be expected to recur after the disease has established itself in its new habitat.

"(D).—*Sub-Tropical Malaria.*

"(14) Endemic malaria occurring in localities in which owing to climatic circumstances the active transmission of malaria is subject to prolonged periods of interruption constitutes sub-tropical malaria. In these areas, owing to the mechanism of malarial immunity "equilibrium" between infection and immunity is maintained with more difficulty than in tropical countries.

"(15) Marked spontaneous fluctuations in the spleen-rate over a period of years are of frequent occurrence in connexion with sub-tropical malaria.

"(16) The use of the terms 'healthy,' 'moderately endemic,' 'highly endemic' and 'hyper-endemic' to indicate spleen-rates of various percentages may be inapplicable in the case of sub-tropical malaria. In these circumstances the *periodical* estimation of the spleen-rate and the calculation of its 'percentage reduction' over a period of years will afford information of considerable value.

"(E).—*Fulminant Malaria.*

"(17) Fulminant malaria is apt to occur in localities where the active transmission of malaria is annually subject to prolonged periods of interruption.

"(18) 'Interruption' of infection is associated with a decrease in tolerance to malarial infection, as the result both of the absence of reinfection and of the elimination of residual infection.

"(19) A fulminant epidemic occurs in circumstances in which a great relative decrease in immunity is associated with a marked temporary increase in the amount of infection.

"(20) *A great decrease in relative immunity* occurs in areas where the physiographical conditions are normally so unfavourable to endemic malaria that the spleen-rate spontaneously undergoes a great diminution during a short period of years.

"(21) *A marked temporary increase in the amount of infection* may occur periodically in such areas as the result of excessive rainfall and 'flooding' producing conditions abnormally favourable to the malaria parasite and to its transmission from man to man.

"(22) The exact significance of flooding still remains to be elucidated, but it is probable that the unusual facilities that it affords for the multiplications of anophelines is not its sole influence.

"(23) The immunity conferred by a fulminant epidemic slowly disappears, but may become greatly reduced in about five years. As the result of this circumstance fulminant epidemics may be expected to occur usually at intervals of not less than the above period.

"(24) A *relatively* high spleen-rate compared with other areas affords no protection against a fulminant epidemic as it is not the height of the spleen-rate but the *amount of reduction* it has undergone that is of paramount importance.

"(25) A low spleen-rate in an area subject to fulminant malaria may have a widely different significance to a similar spleen-rate in a tropical country. In the case of the former a fulminant epidemic may be anticipated to follow the next occurrence of flooding, whilst in a tropical area no such effect will be produced.

"(26) Fulminant malaria is more particularly the result of infection with the malignant tertian or tropical parasite.

"(27) The mitigation and even prevention of fulminant epidemics may be predicted to follow the carrying out of measures designed to prevent the occurrence of flooding.

"(F).—*Epidemic Malaria.*

"(28) Epidemics of malaria, either generalised or localised, may occur in any part of the endemic area of malaria without reference to climatic circumstances. They are associated with conditions which either *temporarily* increase the amount of local infection or lower the immunity of the community and more particularly with conditions which do both.

"(29) In spite of the mutual dependence of these epidemics and fulminant malaria on loss of 'equilibrium' between the amount of infection and the degree of immunity, the fact that they possess no other characteristics in common renders it expedient to differentiate them from one another."

[It is obvious that a paper of this nature requires careful and detailed study. The use of the term "Tropical Malaria" as a division of Endemic Malaria, and with an epidemiological significance, appears to be rather a mistake, for most students regard tropical malaria as the form due to *P. falciparum*, and employ it in a clinical sense. At the same time, the author clearly explains what he means by it.

His review of the literature, though very extensive, is not always accurate. For example, after stating that it is a matter of surprise that no undoubted evidence of fulminant epidemics has been forthcoming from the Nile delta, he quotes the reviewer as saying that at Khartoum locally acquired malaria is rare, whereas the sentence should read "is *now* rare." It is chiefly, if not wholly, due to anti-mosquito measures that malaria is no longer common there.]

Three maps showing respectively the site of epidemic areas in India, the known distribution of fulminant malaria throughout the globe, the annual average period during which in India the active transmission of malaria remains in abeyance (Hill stations excluded), aid the reader in his study of what is undoubtedly an important contribution to the epidemiology of malaria. A. B.

GILL (C. A.). **Note on the Value of the Parasite-Rate in the Measurement of Malaria.**—*Proc. Third All-India Sanitary Conference, held at Lucknow, Jan. 19–27.* 1914. Vol. 4. Papers. Suppl. to *Indian Jl. Med. Research.* pp. 18-22. With a chart.

After pointing out that the spleen rate of a community is more easily ascertained than the parasite rate, and that it also furnishes a more reliable estimate of the prevalence of malaria than the latter, the author describes the investigations he conducted during a malarial survey of Amritsar City in November 1913, and tabulates his results as regards both rates. He divided his splenomegaly cases into six classes, according to the degree of splenic enlargement present.

His conclusions are:—

"(1) As an index of the amount of malaria in a community the parasite-rate is of less value than the spleen-rate.

"(2) The benign and subtertian parasites in certain parts of Northern India show well marked seasonal variations.

"(3) Whereas benign infections reach their maximum in June, subtertian infections are most prevalent in the autumn.

"(4) In view of these seasonal variations the parasite-rate in any community will depend to a considerable degree on the period of the year when the blood examinations are made.

"(5) In consequence of the above no definite relationship in Northern India can be expected to exist between the spleen and parasite rates; nevertheless, when the spleen-rate is high, the parasite-rate will usually tend to be high also.

"(6) In only 19 per cent. of the children in Amritsar with palpable spleens were malaria parasites discovered in November, 1913, and the *degree* of enlargement did not appear to affect appreciably the chances of finding parasites in their blood at this time.

"(7) In view, however, of the seasonal variation in the prevalence of malarial parasites no deductions can be drawn in regard to the effect of splenic enlargement on the parasite-rate at any other time."

A. B.

PERRY (E. L.). **Recent Additions to our Knowledge of Malaria in the Punjab.** (A paper read before the Punjab Branch of the British Medical Association at Simla, on July 17th, 1914.)—19 pp. With 1 chart. 914. Simla. Printed by Thacker, Spink& Co.

The author affirms that the greatest problem that faces the Sanitary Department of the Punjab is how to deal with malaria. This is evident when one recalls that the great epidemic of 1908 caused in a few months the deaths of far more than a quarter of a million persons.

Much has been done since that time, and a part of the present paper is taken up with a consideration of CHRISTOPHERS's investigations into fulminant epidemics. CHRISTOPHERS showed the part which floods play in the etiology of such epidemics, and proved that irrigation has no special relation to their mortality distribution. He also held that one of the factors which predisposes the community to suffer from a fulminant epidemic is shortage of food, the result of deficient rainfall.

Perry took up the investigation where CHRISTOPHERS left it, and conducted a study of the malaria of the community in the period between epidemics.

He has been able to show that in the Punjab the prevalence of the malaria parasite and the prevalence of splenomegaly are both subject to an enormous degree of fluctuation. There is a great contrast between the Punjab and countries where malaria is constantly and highly endemic. A chart shows the fall in spleen rate which took place in the Gujrat district after the 1908 epidemic, and it was the observations which led to its construction that convinced Perry that he was wrong in supposing that those parts of the Punjab which suffer periodically from epidemic malaria normally exhibit a high degree of endemic malaria. The chart shows that by 1912 the spleen rate had fallen to 20 per cent., the parasite rate to about 8 per cent. and the crescent rate practically to zero. As the author points out, these remarkable results show how dangerous it would be to dogmatise on the effect of anti-malarial measures in the Punjab unless the observations were continued throughout many years. Perry believes that his investigations must engender a hopeful spirit.

As he says :—

> "If in these areas, subject to epidemic visitations, endemic malaria was very severe, the task of dealing with malaria might appear well-nigh hopeless. But when we study such an area and discover that, far from what we had originally supposed, in the absence of epidemic conditions, such an area can become comparatively healthy, and when we also remember that even in severe epidemic years such an area may escape a visitation, we realise then how preponderating is the effect of the exciting cause of an epidemic. I feel convinced from the evidence CHRISTOPHERS has collected, that the great exciting causes of these epidemics are floods. If I am correct I think you will all agree that, judging from great achievements in the Punjab in the past, the genius of our engineers will some day devise means of controlling these disastrous floods."

He has some interesting remarks to make on racial immunity and racial differences, comparing for this purpose the conditions present in such a centre of endemic malaria as the Jeypore Hill country in the Madras Presidency, where the aborigines present a different clinical picture to the immigrants, with those found in the Punjab, where the races may be termed non-immunes. As he promises a further paper on this subject, it need not be discussed here in detail, but his remarks should be studied by those interested in the epidemiology of malaria, which of late years has attracted more attention in India than anywhere else. A. B.

KENRICK (W. H.). **Malaria and Rice Cultivation.**—*Proc. Third All-India Sanitary Conference held at Lucknow, Jan. 19–27.* Vol. 4. Papers. Suppl. to *Indian Jl. Med. Research.* pp. 64–70.

At the instigation of the General Malaria Committee, Major Kenrick instituted an enquiry in the Central Provinces as to the conditions under which rice cultivation proves harmful by favouring the spread of malaria. There is a large and increasing area under rice, and the author describes its physical features, its climate, the type of irrigation employed and the method of cultivation, which is almost universally "broadcast sowing," and not transplantation. It is to be noted that the irrigation is merely additional to the rainfall, and hence is more frequently employed in the case of light, non-retentive soils.

The tanks are an important feature, and usually contain water weeds, grass and fish of several species. No less than 30,000 children between the ages of two and ten years had their spleens examined, and the rate in the healthy (open plains country) which worked out at 4·3 per cent., is compared with the 24·1 per cent. found in the endemic areas which are invariably in the neighbourhood of jungle, long grass, forest, thick vegetation and undergrowth, *i.e.*, in the proximity of shade.

Suitable breeding grounds for anophelines are also an essential factor in the production of these unhealthy areas. The following species are found: *A. fuliginosus*, *A. fowleri*, *A. culicifacies*, *A. rossi*, *A. sinensis*, *A. maculipalpis*, *A. barbirostris*, *A. punctulata*. Blood examinations were also conducted, and the findings in 400 films classified according to the degree of splenic enlargement. The quartan parasite was found to be associated with the higher degrees of splenomegaly, and a much higher percentage of parasites was found in the cases with moderately enlarged spleens than in those where the enlargement was great. Irrigation and shade are the two factors which make for danger, and it is therefore very important that the channels should be as open as possible, and that anything in the form of shade-yielding vegetation should be cleared away. A. B.

MARJORIBANKS (J. L.). **Report on Certain Features of Malaria in the Island of Salsette.**—*Proc. Third All-India Sanitary Conference held at Lucknow, Jan 19–27.* Vol. 4. Papers. Suppl. to *Indian Jl. Med. Research.* pp. 23–63. With 2 charts and a map.

Salsette is an Indian island not far from Bombay, and in this very careful and exhaustive paper. furnished with a map, charts and tables, the author gives an account of the malaria and the malarial conditions found upon it. Naturally these are chiefly of local interest, and it will be sufficient to state that, after a general description of Salsette, in the course of which he mentions the trees and crops as well as the climate and rainfall, he discusses the vital statistics at some length, and then enters fully into the question of the indigenous anophelines.

Thereafter he considers the results of a spleen census which he conducted, and finally concludes the main paper with a series of useful and practical recommendations.

Some of these may be mentioned. Speaking of the immunity enjoyed by those villages which are swept by the sea-breezes, he suggests that it might be advisable to attack the resting places of mosquitoes, especially as, with the exception of certain borrow-pits, it is not possible to deal with their breeding places.

Elsewhere he advocates the provision of a travelling dispensary as the only way to keep attention constantly fixed on the state of the children's spleens.

He is also careful to consider the question of new building areas, which is inseparably associated with the provision of efficient means of communication.

One of the three appendices is rather out of the common in that it gives minute instructions for the capture and breeding-out of larvae, details the apparatus used, furnishes an example of a record chart or register and supplies directions for the use of searchers.

[In this connection one finds no mention of the useful collecting tin with half its bottom replaced by wire mesh, introduced long ago by St. George GRAY, while it may be stated that in any record chart it is very advantageous to have entries stating whether eggs, larvae, pupae or empty pupal shells were found.]

This report is a very full and careful one, and if all areas likely to undergo development were surveyed in this fashion, and the necessary action taken, great benefit would result and both lives and money would be saved. A. B.

HORNE (J. H.). **Malaria in Wynaad.**—*Proc. Third All-India Sanitary Conference held at Lucknow Jan. 19–27.* 1914. Vol. 4. Papers. Suppl. to *Indian Jl. Med. Research.* pp. 71–74.

Wynaad, a hilly plateau in the Nilgiri hills, lying at an elevation of 3,000 feet, has long been regarded as one of the worst fever areas in Southern India.

As Captain Horne shows, this is explained by the presence of numerous swamps with streams emerging from them. He found it difficult to obtain adult anophelines owing to the nature of the house interiors, which were dark and lofty, but anopheline larvae were present in abundance, and the list of those bred out and determined is given. Eleven species were recognised.

Spleen and parasite rates were taken both in the villages and on the estates. The results are tabulated, but scarcely require detailed consideration. A. B.

DE MELLO (Froilano). **Contribution to the Study of Malaria in Gôa.** —*Proc. Third All-India Sanitary Conference held at Lucknow, Jan. 19–27.* 1914. Vol. 4. Papers. Suppl. to *Indian Jl. Med. Research.* pp. 1–14.

Malaria is endemic in Goa, and hitherto anti-malarial measures have made no great progress, chiefly because the medical men there have too much other work to do, and there is also a lack of inclination and personal enterprise. The author's account of the disease in Goa is purely of local interest. It may be noted that it is usually benign, though widespread. Certain localities, including the capital, Nova-Goa, which were once notoriously malarious, are now very healthy. This appears to be due to systematic quininisation, which, the author suggests, may have attenuated the virulence of the malarial parasite. [In Brazil it is believed that prolonged quininisation has resulted in the production of a quinine resistant strain which may possess considerable virulence.]

Anti-malarial regulations have been drawn up by the Board of Health, and are detailed by Dr. Mello. If they can be carried into effect, they should be productive of much benefit A. B.

HODGSON (E. C.). **A Preliminary Note on Malaria in Madras City.**—*Indian Jl. Med. Research.* 1914. Apr. Vol. 1. No. 4. pp. 703–706. With a map.

Madras is a curiously scattered city covering 27 square miles, and situated on a low-lying strip of sandy soil facing the Bay of Bengal. Its greatest length is 9 miles, the greatest breadth 3½ miles, so that most of it faces the sea. The author describes the topographical conditions as follows:—

"The land on which the city is built is extremely flat, the highest point being only some twenty feet above the mean sea-level, while large areas of the town are only some five feet to six feet above the level of the sea at high tide. The difficulties in dealing with drainage problems will be appreciated when it is realised that the average depth of the sub-soil water is two feet above the mean sea-level, and in the rainy season it rises another two or three feet. The consequence is that in some parts of the city, at the end of the rains, the surface of the soil is scarcely a foot above the sub-soil water-level, and almost any depression in the land in these areas is bound to contain water for many weeks on end until the sub-soil water-level sinks again. When I first took over my new office, situated in one of these depressed areas, I noticed some shallow pools lying among grass in the compound in which some young anopheline larvae were breeding. I ordered some of my staff to bale these pools out. They completely failed to do so. The depressions were below the sub-soil water-level, and as fast as the men baled out, fresh water ran in. The monsoon, an exceptionally heavy one, had just ended."

It is generally believed by the inhabitants that malaria is quite a new feature in the history of Madras, but opinions differ as to the date of its origin and the causes of the initial outbreak.

In 1913 Hodgson made a spleen census of the city, examining 4,000 children under ten years of age. His results are shown on a map which is reproduced, as the graphic method he employs is an ingenious and useful one. He thinks the indications point to the northern part of the town having been much longer affected than the southern. The latter seems only to have been attacked during the last year or so, a view supported by the hospital returns.

After a further consideration of local conditions, the author says:—

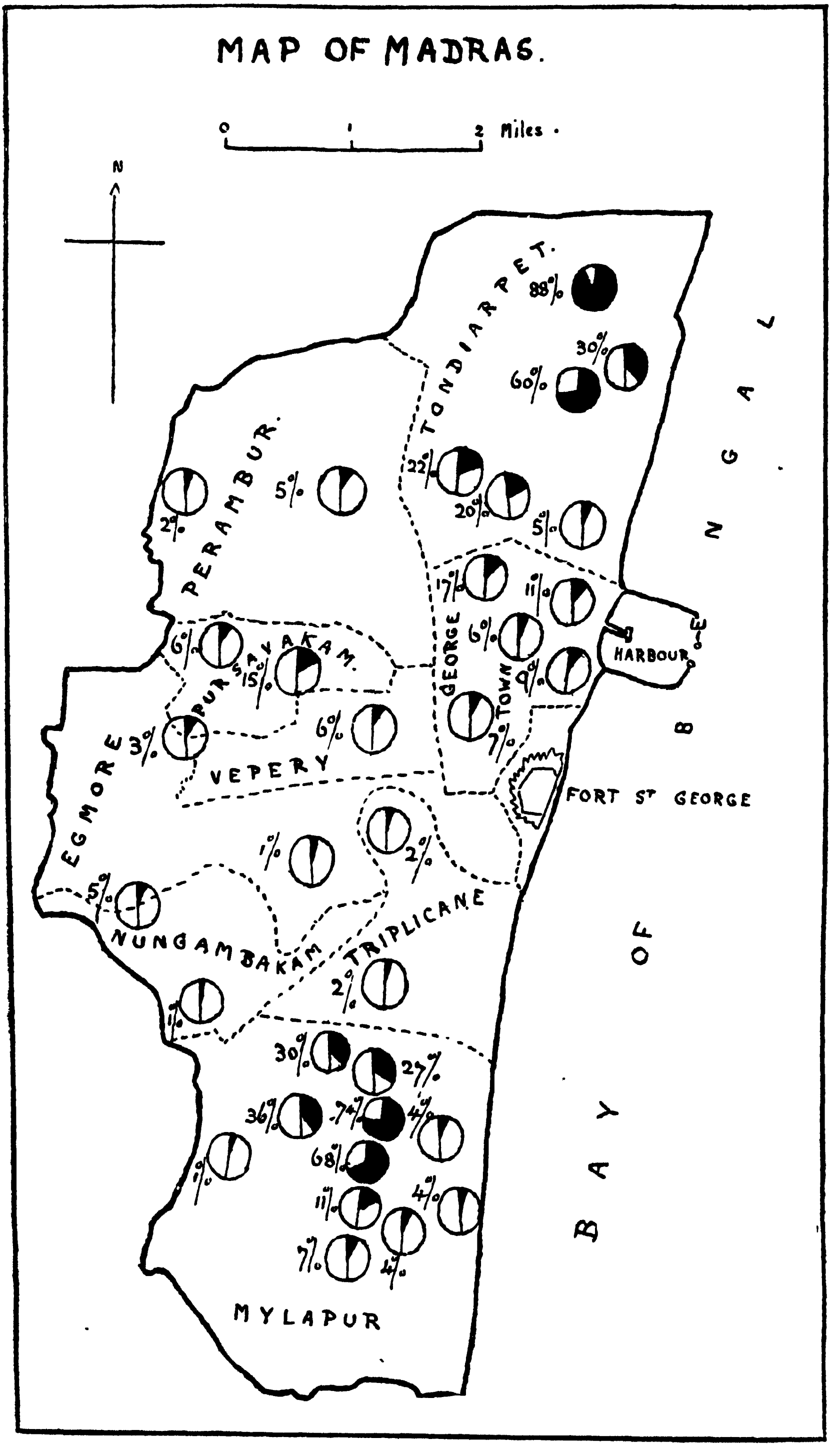
"We have, therefore, a city with an extremely high sub-soil water, many temporary sheets of water, rice fields, tanks and wells. Young anopheline larvae, at any rate, are to be found in them, and yet until recent years, and even now in the greater part of the city, very little malaria has been present. Judging from the present epidemic conditions in both the northern and the southern ends, and to a less extent in the west, the city can suffer severely from malaria. The total death-rate from fever has been only five or six per thousand per annum, a mere trifle compared to that of the cities of Northern India."

That malaria carriers are not lacking is shown from the list of anopheles found breeding in Madras:—(1) *A. ludlowi*, (2) *A. barbirostris*, (3) *A. nigerrimus*, (4) *A. jamesi*, (5) *A. fuliginosus*, (6) *A. culicifacies*, (7) *A. rossi*, (8) *A. stephensi*. Of these, *A. ludlowi* was found by Captain HORNE, I.M.S., to be harbouring the malarial parasite.

Hodgson suggests that one of the reasons why malaria has not spread more rapidly in Madras is that the surfaces of exposed sheets of water are too hot to serve as suitable breeding grounds for anopheline larvae.

From his concluding paragraph one may expect that a future communication upon what is an interesting problem will follow in due course.

A. B.


MAP OF MADRAS.
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SMART (A. G. H.). **Epidemic Malaria and Construction Works.**—*Trans. Soc. Trop. Med. & Hyg.* 1914. July. Vol. 7. No. 7–8. pp. 251–258. With a sketch plan.

An account of the conditions resulting in an outbreak of malaria amongst coolie gangs employed upon construction works in connection with a water supply scheme in Kedah (Malaya). Most of the cases were benign tertian or sub-tertian, but a few were quartan. The chief cause of the outbreak was not, as might have been expected, interference with the stream, the level of which, already low, was still further depressed by the engineering operations. These consisted in the formation of a dam which diverted the waters of the Terjun River into a large concrete settling tank. As a result, the river-bed below the dam was nothing but a series of shallow pools containing decomposing vegetation These pools, however, did not harbour anopheline larvae, but only those of *Culex ager*. On the other hand, before the stream had been diverted larvae of several species of anophelines were found both above and below the dam.

Those of *A. leucosphyrus* and *A. kochi* were taken from pools at the edge of the stream, those of *A. sinensis* from an algae-covered pool, while the larvae of *A. maculatus* and *A. karwari* were obtained at the edge of the running stream. The author points out that the last two species tend to occur along with the larvae of *Uranotaenia campestris* which, as FINLAYSON has noted, act as good indicators of places where these anopheline larvae are likely to be found even when the latter are not present at a first examination.

Other breeding places for the larvae of *A. maculatus* were the leakage pools from service pipes. A sketch plan of the Alor Star waterworks, showing the site of the coolie lines, helps the reader to understand the local conditions described.

A. B.

WILLIAMS (Tom A.). **Cerebellar Dysergia from Malarial Thrombosis, with Remarks on the Clinical Forms and Pathology of Pernicious Malaria affecting the Nervous System.**—*Southern Med. Jl.* 1914. Oct. Vol. 7. No. 10. pp. 793–794.

An account of a case which, owing to the presence of a dysergic intention tremor, slowness of speech, exaggerated reflexes with paraesthesiae and a history of blindness with rapid recovery of sight, suggested multiple sclerosis. This was negatived by the very slight progressiveness of the symptoms and the absence of nystagmus and plantar extension. There was as much difficulty in standing with the eyes open as when they were closed which, with other symptoms showing that efferent impulses were imperfectly measured owing to defect in the central apparatus, excluded tabes dorsalis.

The positive signs of dysmetria indicated a lesion of one of the efferent cerebellar functions, and the permanency of this symptom showed that there had been actual destruction of a portion of the cerebellar apparatus.

The author discusses the cause and decides that the symptoms were probably due to multiple malarial thromboses of the intracranial vessels, resulting in areas of necrosis.

The patient, an American journalist, aged 38, suffered from pernicious malaria during the Cuban war, and the following year the symptoms began to show themselves, i.e., a numb feeling in hands and feet, dysmetria, slow speech, loss of vision with rapid recovery of sight, a heavy feeling in the back and soreness of the spine. He was apt to fall down when walking in the street, and his skill in typewriting had greatly suffered. The Noguchi-Wassermann test was negative, and there was no lymphocytosis of the cerebro-spinal fluid. No parasites were present in his blood a month before the author saw him.

Williams points out that the condition is unusual, for pernicious cerebral malaria is either fatal at the first attack or in a relapse, or, under proper treatment, recovery occurs which is complete.

[Unfortunately the author does not state exactly how long after the malarial attack the nervous symptoms began—a matter of considerable importance in view of his conclusions.]

A. B.

Dowden (R.). **Three Cases illustrating Unusual Sequelae of Malarial Fever due to** *Plasmodium falciparum.*—*Indian Med. Gaz.* 1914. July. Vol. 49. No. 7. pp. 260–263.

Two of the three cases recorded possess a medico-legal interest. The other, which was an example of severe *P. falciparum* infection in a Burmese woman, shows how the effects of malarial cerebral lesions may persist, for, though the patient under appropriate treatment recovered from the malarial attack, she was left with complete motor aphasia. She understood all that was said to her but could not utter a sound. The condition still persisted after six weeks. The patient then left the hospital and her subsequent history has not been traced.

In the medico-legal cases insanity showed itself as a sequel to the malarial attack. In one instance a quiet and elderly Chinese developed homicidal tendencies as a result of chronic malaria with febrile accessions ; in another a coolie, also the victim of chronic malaria, who was in addition a sexual degenerate, became depressed and weak-minded. He suffered from ordinary hallucinations, and his habits either became more depraved, or he imagined they had become so. He improved under treatment.

[These cases are of interest, as the forensic aspects of tropical medicine have not received the attention they merit.]

A. B.

Clarenc (H.). **Les Méthodes d'Administration de la Quinine.**—*Bull. Soc. Méd. de l'Ile Maurice.* 1913. Oct.-Nov.-Dec. Vol. 31. 2me Serie. No. 34. pp. 51–62.

*Clarenc, as the result of 45 years' clinical experience in Mauritius, is a strong upholder of the value of intramuscular injections of quinine. He criticises the view of Rogers upon this subject and, in opposition to the work of MacGilchrist, cites that of Webb [see this *Bulletin*,

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* This review replaces that published in this *Bulletin* Vol. 4, p. 93, where a remark on the use of neem made by Vinson is attributed to Clarenc.

Vol. 1, p. 649.] He has found again and again that when quinine given, according to various methods, by the mouth has failed, intramuscular injections have succeeded. He prefers to employ the sterile quinine solutions as supplied ready for use in ampoules, and has recourse to the injection method whenever he is satisfied that the case is one which is unsuitable for oral administration. He admits that the latter is simpler and, taking everything into consideration, less dangerous than the injections but, like many others, he has been forced to have recourse to the needle, and he cites cases exemplifying the necessity of employing this mode of medication. The dose which he administers varies from 50 to 75 centigrammes of the bihydrochloride according to the case.

The following is his method of using quinine as a prophylactic.

1. When the febrile attacks are intermittent and recur at short intervals at the same time, the quinine should be given on the days when the fever is due and should be continued in full doses for three weeks to a month.

2. If the febrile attacks are irregular the quinine should be given in single doses every four hours, or in double doses every eight hours for a period of forty-eight hours following the last attack. Thereafter the drug is given six-hourly for another forty-eight hours; then, according to age, the patient takes from 25 to 50 centigrammes for three weeks to a month.

At the same time, after citing the view of Sir RONALD ROSS that quininisation should be continued for three months in order to effect a radical cure, he admits that a longer period than a month may be required, and states that each case must be judged on its merits.

He concludes his paper with some notes testifying to the efficacy of a preparation known as the opiate and pills of Gaffard d'Aurillac which, from what he says, would appear to be useful in the class of case which is often benefited by Warburg's tincture.

A. B.

GILBERT (L. E.). **The Treatment of Malaria. Opinions asked for.** [Correspondence].—*Indian Med. Gaz.* 1914. Aug. Vol. 49. No. 8. p. 331.

A letter, the burden of which is, " What is the proper treatment of malaria ? " The author suggests that in order to decide on the right dose and the correct method of administration, some definite proof of cure or infection is required, like the Wassermann test for syphilis. He asks if this is beyond our laboratory experts. [He may be referred to this *Bulletin*, Vol. 2, p. 557.]

He then gives an account of his own methods. For serious cases he employs intravenous injections, giving seven grains of quinine bihydrochloride boiled in 20 minims of the water which is handiest. He repeats the dose in four hours, and again in four hours, giving twenty-one grains in all.

He has an experience of about two hundred of these injections, none of which caused any unpleasant symptoms. He asks if they are dangerous, if the dilution is too small, if there are records of danger. [Again he may be referred to this *Bulletin*, Vol. 2, p. 324, and also to a paper by THAYER in the *Bulletin of the Johns Hopkins Hospital* (1911, see Second Review, Wellcome Tropical Research Laboratories, Khartoum, 1911.]

In ordinary cases he was accustomed to order five grains of the sulphate thrice daily, always prescribing it in solution when fever was present or the digestion was upset. Latterly, as his patients have often returned with malaria, due either to re-infection or to relapse, he has increased the dose to ten grains thrice daily. This is continued for fourteen days. Then twenty grains a day are given for a month, and then ten grains a day for another month, together with an iron and arsenic tonic. He admits that this procedure is purely empirical, and passes on to discuss intramuscular injections. He thinks they are indicated during the fever when the patient is very much upset, and he uses them himself in cases which suffer from slight fever or malarial headache, or neuralgia, and when quinine by the mouth does not seem to benefit, possibly, as he adds, because they don't take it, having lost faith in it. He asks if slow absorption is really a contraindication in ordinary cases, and if tetanus is a real danger. He has given about 3,000 injections, and is convinced of their value, though he admits that scientific proof regarding their virtues is lacking.

He suggests that the *Indian Medical Gazette* should take up the question, and as a result the Editor invites opinions and offers to publish them.

A. B.

i. McGRIGOR (H. J.). **Intramuscular Injections of Quinine.** [Correspondence]. *Jl. Trop. Med. & Hyg.* 1914. Nov. 2. Vol. 17. No. 21. p. 336.

ii. Ross (Ronald). **Intramuscular Injection of Quinine.** [Correspondence]. *ibid.* Nov. 16. No. 22. p. 352.

i. The case is cited of a patient in Borneo who had an idiosyncrasy to quinine, suffering from intense headache, vertigo, nausea, and a severe form of urticaria, so that he had not taken any of the drug. The author gave him 10 gr. of bi-hydrochloride of quinine by the mouth with distressing results, and afterwards hypodermics of the same salt three times a day for two days, then once daily for a week. No poisoning took place from these injections. The patient recovered, purchased a syringe and injected himself twice a week as a prophylactic. He had no further attacks.

ii. Ross comments upon this case. He thinks that it merely confirms his view that quinine given intramuscularly is not absorbed, as otherwise the patient would again have shown signs of distress. There is no definite proof of cure for such chronic cases often improve for long periods without any treatment and, in any case, the first dose by the mouth might have destroyed vast numbers of parasites. He again calls for scientific proof, and says that in the meantime he wonders why injections are given, especially as he suspects that many cases supposed to be cured by them really relapse, while he believes that many of the fatal results recorded in pernicious malaria occur simply because the quinine has remained unabsorbed in the tissues.

A. B.

PETER (A. G.). **Note on Limitation of the After-Pain of Quinine Injections.**—*Lancet.* 1914. Oct. 24. p. 994.

The author appears to have been rather unfortunate in his use of intramuscular quinine injections, for his patients have suffered much from after-pain. He mentions one case where tenderness still persisted three months after the last injection had been given, and this though the utmost care had been taken in the way of securing strict surgical cleanliness. [Peter, however, does not say in what form he used the quinine—a notable omission—or in what doses he gave it.] His way out of the difficulty has been to add quinine and urea hydrochloride to the quinine which he usually employs.

[One need not give the details of his method, which exemplifies a curious form of procedure. It is very strange that it has never occurred to him to use the quinine and urea hydrochloride *alone*, as employed by COHEN and others. (See this *Bulletin*, Vol. 4, p. 373.)]

A. B.

BRODBENT (C.). **Intravenous Quinine in Malaria.** [Correspondence]. *Indian Med. Gaz.* 1914. Nov. Vol. 49. No. 11. pp. 448.

Brodbent states that both his own experience and the statements of such authorities as ROSS, SEMPLE and ROGERS, have led him, in cases of severe infection, to discard the use of intramuscular quinine injections in favour of the intravenous method.

He records three such cases in which he gave from 5 to 7 grains of the hydrochloride, or bi-hydrochloride, intravenously, with gratifying results. In one of these cases, complicated by enteric fever, quinine by the mouth and by intramuscular injection failed, although the onset of deafness indicated that it had been absorbed.

As regards a fourth case, where a fatal result followed treatment by the oral and intramuscular administration of quinine, the author states that had the intravenous method been permitted he believes the patient might have been saved.

He says that in severe cases in future he will give three doses of 7 grains at six days' interval, and endeavour to watch the blood of patients thus treated for the next three months.

A. B.

CRESPIN (J.). **Quinine et Hectine dans le Paludisme.**—*Bull. Gen. de Therap.* 1914. Vol. 167. pp. 463–471.

The author, while agreeing that quinine is of great value in malaria, inveighs against the custom of taking it in a haphazard manner. He is not certain but that the cirrhosis and chronic nephritis met with in old malarics who have undergone intensive quinine treatment over a long period may not be due to the action of the drug. He puts forward a plea for the standardisation of doses, and then points out that quinine acts in two distinct ways, according to the dose given. In large doses it is anti-parasitic, antifebrile, and hinders phagocytosis. In small doses it acts as a tonic, accelerates nutrition and so resembles hectine which, in doses of 0·10 to 0·20 gramme, powerfully stimulates phagocytosis.

He considers the conditions where quinine is likely to fail, *i.e.*, in those febrile attacks which follow indigestion or fatigue, and in which malarial parasites are not found in the blood, and in chronic aestivo-autumnal cases where crescents are present. It is under such circumstances that hectine proves its value.

In certain instances, or after large doses of quinine have been given, it is often advisable to exhibit an anti-haemolytic such as chloride of calcium, cholesterin, or hectine, for a few days, and then to give another strong dose of quinine. The author believes hectine to be the best of these anti-haemolytics because of the manner in which it favourably influences phagocytosis.

He has used hectine in the doses indicated both by injection and by the mouth during a period of four years, and finds that, as Rogues has stated, it increases both the red cells and the haemoglobin content. He is very satisfied with it, and has practically no untoward results to record from its use.

A. B.

Cantlie (James). **A Useful Prescription in Chronic Malaria with Enlarged Spleen.**—*Jl. Trop. Med. & Hyg.* 1914. Nov. 2. Vol. 17. No. 21. pp. 323–324.

In cases of chronic malarial splenomegaly the author advocates the use of quinine, arsenic, opium, and mercury combined according to the following formula :—

℞

Quininae Hydrochlorid ..	gr. v. to gr. vii.
Acid. Arseniosi	gr. 1/36th to gr. 1/24th.
Pulv. Ipecac. Co.	gr. iii to gr. iv.
Hydrarg. Subchlorid ..	gr. 1/10th to gr. 1/6th.

Fiat pulv. in cachets.

Sig. One at 11 a.m. and another at bed-time.

He points out that the ingredients are really those of the old fever powder commonly used in England when malaria was rife. In those days, however, the mercury was given separately in the form of blue pill, and for its purgative action. Cantlie affirms that it owes its value to its germicidal action, and that mercury is not a suitable purgative in cases of tropical liver. He has also something to say about the reason for employing the other ingredients in what is undoubtedly a very useful combination.

A. B.

Yofé (Hillel). **Traitement des Cachexies Paludéennes.**—*Bull. Soc. Path. Exot.* 1914. Nov. Vol. 7. No. 8–9. pp. 678–685.

As the result of a prolonged (25 years) and extensive clinical experience in one of the most malarious districts of Palestine, the author emits the following views as regards the treatment of chronic malaria, the typical symptoms of which he describes :—

1. There is a form which is incurable.
2. Cases occur which can be completely cured.
3. There are cases which can be so greatly benefited that the patients can resume work and lead lives not very far removed from the normal.

4. It is possible greatly to reduce enlarged malarial spleens even after they have persisted for as long as ten years and are very hard.

(Records are given of four cases exemplifying Nos. 3 and 4).

5. The basis of the treatment is the administration of quinine regularly and without interruption by the intramuscular method.

6. Even after all febrile symptoms have disappeared continue the injections for from five to ten days, but in decreasing doses.

7. Supplement the quinine therapy by the use of cacydolate of soda, ergotine and iron, and especially by methylene blue in the form of pills.

8. The ergotine has an undoubted influence in diminishing the splenomegaly.

9. In cases without oedema, but showing profound debility, and especially in children, the injection of artificial serum will be found to have an excellent effect.

10. Change of climate is of great value, but in many cases care must be taken to select the proper time for sending the patient away. He should not leave until he has made considerable progress under the treatment indicated.

The author concludes with some remarks on quinine haemoglobinuria, and on indications and contra-indications to quinine therapy as furnished by blood examinations, but these do not call for special notice. Puncture of the spleen is only justifiable in cases of difficult diagnosis, as when chronic malaria has to be distinguished from kala azar.

[The paper must be consulted for details of the treatment, but unfortunately the author does not state what salt of quinine he employs for the intramuscular injections. The question of splenectomy in very chronic and severe cases is not considered.]

A. B.

MacGilchrist (A. C.) (i) **Cinchona Derivatives Inquiry. First Communication.**—*Indian Jl. Med. Research.* 1914. July. Vol. 2. No. 1. pp. 315–335. With 3 charts and 4 text figs.

(ii) **Second Communication.** *Ibid.* pp. 336–348.

i. MacGilchrist continues his valuable work upon cinchona derivatives, which were obtained from three sources:—(1) The Government quinine factory at Mungpoo, near Darjeeling. (2) Merck & Co., Darmstadt, and (3) Zimmer & Co., Frankfort-on-Maine. In this and in a following paper he only deals with some of these, so that he has still a fruitful field of enquiry before him. He mentions a Darmstadt preparation called quinetum (a mixture of the alkaloids as they occur in the bark of *C. succirubra*, containing quinine, cinchonine, cinchonidine and amorphous bases), quinium (an extract prepared according to a French formula, containing all the constituents of bark with the exception of woody fibre, and said to be better than quinine in rebellious cases of malarial fever), and a species of solid quinoidine from Germany occurring in irregular fragments. Quinoidine is a mixture of the amorphous alkaloids of cinchona bark, and the substance received from the Mungpoo factory is semi-solid, tarry or treacle-like.

In the paper under review the author considers only his investigations into the Mungpoo products, and he first of all gives an account of their botanical sources and methods of manufacture.

He describes how quinine sulphate is obtained, how residual alkaloid is prepared, and the process of separating out the individual alkaloids, *i.e.*, cinchonidine, quinidine, cinchonine and quinoidine.

The object of the author's quest was to determine which derivative would be most useful for testing malaria, *i.e.*, would kill the parasite, and yet cause least inconvenience or harm to the host. For this purpose he employed infusoria, as representing protozoa, and guinea-pigs. He proposes also to make use of cats.

Details regarding technique and the experiments are furnished, and charts give a graphic representation of the relative lethality of neutral solutions of the sulphates of quinine, quinidine, cinchonine, cinchonidine, and quinoidine to *Paramoecium caudatum*, and a species of *Stylonychia*. The author summarises his results, but it is only necessary here to quote his main conclusions which are: "(1) That cinchonidine is the only alkaloid less harmful [than quinine] to guinea-pigs, but on the other hand that its lethality to *infusoria* is much less than that of quinine; (2) that quinidine is more harmful to guinea-pigs and not so lethal to *infusoria*; and (3) that cinchonine is somewhat more lethal to guinea-pigs, but is at the same time much more lethal to *infusoria*. These results certainly suggest that cinchonine should be given a thorough trial."

ii. The hydrochlorides of hydroquinine and ethyl-hydro-cupreine have been tested by the author in respect to lethality, and compared with the hydrochloride of quinine obtained from the Indian Government's quinine factory at Mungpoo. The results are best shown by quoting in full the summary and conclusions:—

"Ethyl-hydro-cupreine and hydroquinine are less lethal than quinine to guinea-pigs; cinchonine is slightly more lethal than quinine. Ethyl-hydro-cupreine is more lethal than any of these towards *Paramoecium caudatum* and other *infusoria*; cinchonine comes next in order of lethality; quinine and hydroquinine are for all practical purposes of equal lethality to these *infusoria*.

"The pharmacological action of ethyl-hydro-cupreine is very similar to that of quinine.

"When exposed for hours or days *continuously* to the action of fairly dilute solutions (1 : 150,000) of these substances, *P. caudatum* is unable to acquire any immunity against these toxic agents or adapt itself to life in such media. This does not preclude the possibility of immunity being acquired if the solutions were still *more dilute* or if the exposure were *intermittent*.

"The results obtained suggest a possibility of the superiority of ethyl-hydro-cupreine and cinchonine over quinine in the treatment and prophylaxis of malaria. The former *may be* difficult to prepare and expensive; the latter is easily obtainable and cheaper than quinine. The former has not yet been tried in *malaria; the latter has, and there is evidence, clinical and experimental, that cinchonine is superior to quinine as an anti-malarial agent. Moreover, as cinchonine is sometimes fraudulently substituted for quinine and no ill-effects have apparently followed this use of cinchonine, any slightly greater toxicity to mammals which this alkaloid may possess is a negligible factor.

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* Since this was written IZAR and NICOSIA (Catania) have reported success with this substance in cases of malaria refractory to quinine.

"Quinine (methyl-cupreine), hydro-quinine (methyl-hydro-cupreine) cupreine, and ethyl-hydro-cupreine are all closely related and appear to have a similar pharmacological action; in contradistinction to cinchonine these substances display more of a paralysing than stimulating action on the convulsive centres of the brain."

The author states that Zimmer & Co. of Frankfort-on-Maine have succeeded in preparing hydroquinine (methyl-hydro-cupreine) synthetically from quinine. It is probable that from this the ethyl-hydrocupreine or "Optochin" is prepared.

Cinchonine salts are the cheapest of the cinchona alkaloid salts, and both cinchonine and hydroquinine occur in cinchona barks. The bark of *Cinchona micrantha* is specially rich in cinchonine.

Cupreine is an alkaloid occurring along with quinine in the bark of a false cinchona, and it is said that it has been artificially converted into quinine. For further details this useful paper should be consulted in the original. A. B.

HEHIR (P.). **Prevention of Malaria in the Troops of our Indian Empire.** *Indian Med. Gaz.* 1914. Aug. Vol. 49. No. 8. pp. 305–309.

Throughout our Indian Empire malaria is the chief cause of inefficiency both amongst European and Indian troops. As a rule infection takes place in the cantonment, and it is with this aspect of the question that Hehir's paper chiefly deals. He indicates how a mosquito survey of a cantonment should be carried out, and how valuable evidence as to malarial prevalence is to be obtained from a spleen census amongst the children of a cantonment. The spleen rate in troops is not reliable. Notes upon anti-mosquito measures follow, and the author testifies to the excellent results which they have yielded at Agra, Mhow, Belgaum, Hyderabad (Sind), Quetta, Bangalore, Cawnpore, River Forts (Rangoon), Mandalay and Lucknow. Failure, in his opinion, is due to patchwork and change of policy. Soldiers should be trained to destroy the imagines in barrack rooms. The punkah coolie may serve as a fertile source of infection.

A wise measure is to keep European troops at non-malarial hill stations until the malarial season is past, and it is imperative carefully to treat all carrier cases.

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Quinine should not be given in cases of doubtful pyrexia, where the malarial parasite has never been demonstrated in the blood. The author discusses the question of prophylaxis at some length. His remarks, though very sound, contain nothing new and need not be quoted, but a note as to his own practice may be permitted. He states: "One's personal experience is that the best prophylactic dose of quinine during the malarial season where malaria is comparatively mild is 5 grains daily, where it is severe 5 grains daily for six days and 10 grains on the seventh day weekly, and where it is very severe 5 grains for six days and 15 grains on the seventh day weekly."

He concludes with a plea for the enforcement of *all* preventive measures, and points out that the procedure adopted must be determined by local circumstances. A. B.

MACDONALD (W. R.). **A Short Note on the Use of Larvicidal Fish in Combating Malaria Fever.**—*Proc. Third All-India Sanitary Conference held at Lucknow, Jan. 19–27.* 1914. Vol. 4. Papers. Suppl. *to Indian Jl. Med. Research.* pp. 75–77.

The larvivorous fish of Madras City are mentioned. There are three species of *Haplochilus*, the well-known *Chela*, *Rasbora daniconius*, the common minnow, and *Therapon jarbua*. The author comments on the necessity of clearing away algae, weeds and vegetation growing in the water collections, so that the fish may have free access to mosquito larvae.

In one instance it was found that oiling operations could be carried out without risk to the fish life. Explanatory details are lacking.

A. B.

RHO (F.). **Difficoltà e Successi della Profilassi Chininica massime nei Paesi Tropicali.** [Difficulties and Successes in Quinine Prophylaxis, especially in Tropical Countries.]—*Ann. Med. Navale e Coloniale.* 1914. July. Ann. 20. Vol. 2. No. 1. pp. 53–62.

A general discussion of the subject of quinine prophylaxis, chiefly worth looking at for the tables supplied. Some of these show an arrest in the fall of malaria incidence in recent years, indicating that there is a limit to the benefit which can be obtained by the unassisted method of reliance upon quinine. J. B. Nias.

i. BRESSANIN (R.). **La Profilassi Antimalarica nel Dipartimento Militare Marittimo di Venezia nell' Anno 1913 (aggiuntivi i dati per il 1912).**—*Ann. Med. Navale e Coloniale.* 1914. July. Ann. 20. Vol. 2. No. 1. pp. 43–45.

ii. TACCHETTI (G.). **La Proffilassi Antimalarica del Dipartimento e Piazza Marittima di Taranto durante l'Anno 1913 (aggiuntivi i dati pel 1912).**—*Ibid.* pp. 46–52.

Two statistical reports of the usual type dealing with the results of quinine prophylaxis amongst the Italian naval and military forces of the districts named, presenting nothing of special interest to foreign readers, with the exception that, in the second one, Surgeon-Colonel Tacchetti expresses the opinion that an attack rate of 1 per cent. for new cases exposed to infection is about the lowest that can be expected under a system of unaided quinine prophylaxis. To secure any further reduction, measures specially directed to mosquito extermination must be resorted to. J. B. N.

i. TIMPANO (Pietro). **La Lotta Antimalarica a Condofuri Marina (Reggio Calabria) nel 1912 e 1913. Nota Epidemiologiche e Cliniche.** [The Antimalarial Campaign at Condofuri Marina in 1912 and 1913.]—*Propaganda Antimalarica.* 1914. Oct. 31. Vol. 7. No. 5. pp. 132–138.

ii. ORTA (Francesco). **Propaganda Antimalarica Scolastica nella Provincia di Ferrara, Anni Scolastici 1912-13, 1913-14.** [Antimalarial School Instruction in the Province of Ferrara for the Years 1912 and 1913]. *Ibid.* pp. 138–141.

Two short reports on the subjects for which this periodical was founded, of merely local interest. [The greater part of the present number is occupied by sympathetic notices of the life and work of the late Professor Angelo CELLI, to whom the initiation of the antimalarial campaign in Italy is chiefly due. Professor CELLI's last report on the subject was recently summarised for this *Bulletin.*]

J. B. N.

Balfour (Andrew) & **Wenyon** (C. M.). **The So-Called** ***Plasmodium tenue*** (Stephens).—*Jl. Trop. Med. & Hyg.* 1914. Dec. 1. Vol. 17. No. 23. pp. 353–354. With 2 coloured plates.

The paper which called forth this communication was published in April in the *Proceedings of the Royal Society*, and noticed in this *Bulletin*, Vol. 3, p. 432*. The authors point out that Stephens's diagnosis of a new species was based on the morphological peculiarities of a malarial parasite which he found in a single blood film from a native child in India, which was sent to him. They write:—

> "Had Dr. Stephens been able to study his case clinically from day to day and show that the parasite he describes always assumed the amoeboid form at that particular stage in its development, despite varying technique; that in its further growth and multiplication by schizogony it departed from the type usually associated with the parasite of sub-tertian malaria; that the gametocytes presented some peculiar features; then there might have been some ground for thinking that the parasite was a distinct species. Even then it would be doubtful if sufficient justification existed for the creation of a new species on a single case."

Stephens believes that *Plasmodium tenue* differs from *P. falciparum* in (1) its amoeboid activity, (2) the abundance and irregularity of its nuclear matter.

The authors point out that a plate published in the Third Report of the Wellcome Tropical Research Laboratories (1908), reproduced by them, represents a form of malarial parasite very closely resembling, if not identical with, the so-called *Plasmodium tenue*. In this case a few crescents were found and there was nothing in the clinical history to distinguish the case from one of ordinary tropical malaria. It is generally recognised that, besides the well-known rings, amoeboid forms of the sub-tertian parasite are occasionally found, more especially in the late stages of those cases which have very large infections and often terminate fatally. What determines their presence cannot be stated. It is noted that the degree of amoeboid activity of the benign tertian, as well as the quartan, parasite varies considerably from one case to another. Explanations are suggested. "It is only by a careful study of films made on many occasions and under varying conditions of technique that we can hope to establish the true nature of such an organism and eliminate abnormal or unusual appearances from the customary cycle of development."

Two other cases which one of the authors has come across are of interest in this connection. One was from West Africa and represented by a single film. This, which is reproduced, shows amoeboid forms in large numbers, as well as ring forms and crescents. A second case was that of an Arab seen at Bagdad, who had an enormous malarial infection. Several films were made, an hour and just before his death. Ordinary rings of the sub-tertian variety were very numerous, and there were also present irregular amoeboid forms like those figured by Stephens, which evidently represented the youngest stages of parasites, since in them the pigment appeared to be absent. There was plenty of pigment, however, in the crescents and schizonts. There was much chromatin in the nucleus. Many of the infected corpuscles showed Maurer's dots. An excellent plate illustrates the parasites.

A. G. B.

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*The name of the parasite was there wrongly given as *Plasmodium pertenue*.

ELFER (A.) & von PURJESZ (B.). **Beiträge zur Ausscheidung des Kaliums bei einer Malaria Erkrankung.** [Contribution to the Question of the Excretion of Potassium in a Case of Malaria.]—*Biochem. Zeitschr.* 1914. Vol. 64. pp. 63–71.

The authors point out that despite many observations little is known about the behaviour of potassium in the human body under normal and pathological conditions. The subject is a difficult one, and its study requires great dexterity in chemical technique.

It is generally known that in febrile diseases the excretion of mineral substances may vary considerably. All are agreed that during the febrile access in malaria, contrary to what occurs in other fevers, the excretion of chlorides is not diminished. Accurate knowledge, however, is lacking as regards the behaviour of potassium in malaria, though SALKOWSKI long ago made some observations regarding it in pneumonia, recurrent fever, erysipelas and enteric fever.

The authors, in an endeavour to fill up the gap, carried out observations during a period of eight days upon a case of tertian fever in a young man aged 23. The patient was untreated for two days, was then for a period of four days given daily doses of 1½ grams of sulphate of quinine, and again remained untreated for two days. His dietary during this period is stated, and the chemical analyses performed are shown in the form of tables.

The authors admit that too much stress must not be laid upon their results, and hence it is only necessary to say that they found that next to a high nitrogen loss, specially observable during the febrile period, the greatest disturbance was in the utilisation of the potassium. Their results clearly show also that the decrease of potassium in the urine and faeces persists after the decrease in sodium and chlorine is no longer evident. In this respect the change in the potassium corresponds to what happens to the nitrogenous material, but quantitatively the potassium is low when the nitrogen is high, and *vice-versa*. [The tables should be consulted for details.]

The authors are careful to insist on the fact that the case they examined was both a severe one and was also a fresh infection. [Presumably they mean a primary infection. No record of the blood findings is given.] A. B.

PELLAGRA.

Goldberger (Jos.). **The Cause and Prevention of Pellagra.**—*U.S. Public Health Rep.* 1914. Sept. 11. Vol. 29. No. 37. pp. 2354–2357.

The medical officer in charge of the U.S. Government's pellagra investigations points out the extraordinary immunity enjoyed by attendants in the asylums, where many lunatics contract the disease. Also that in an orphanage of 211 inmates practically all the cases of pellagra were between the ages of 6 and 12 years. The exemption of younger and older children, like the well known immunity of asylum employees, can only be explained by some difference in the diet.

Pertinently he remarks that "no pellagra develops in those who consume a mixed, well balanced and varied diet, such, for example, as the Navy ration, the Army garrison ration or the ration prescribed for the Philippine scouts.

"The inference may therefore be safely drawn that pellagra is not an infection, but that it is a disease essentially of dietary origin; that is, that it is caused in some way such as, for example, by the absence from the diet of essential vitamines, or possibly, as is suggested by Meyer and Voegtlin's work, by the presence in the vegetable-food component of excessive amounts of a poison such as soluble aluminum salts. . . . .

"It has repeatedly been noticed by observers that at insane asylums the 'untidy' (the group in which my observations show scurvy and beri-beri most likely develop) were the most afflicted with pellagra."

[It is not enough to say that the diet of an institution is perfect. The question is, did the pellagrin in that institution regularly eat that diet?]

F. M. Sandwith.

Siler (J. F.), Garrison (P. E.) & MacNeal (W. J.). (i) **Introduction to the Second Progress Report of the Thompson-McFadden Pellagra Commission.**—*Archives of Internal Med.* 1914. Sept. Vol. 14. No. 3. pp. 289–292.

(ii) **Further Studies of the Thompson-McFadden Pellagra Commission. A Summary of the Second Progress Report,**—*Jl. Amer. Med. Assoc.* 1914. Sept. 26. Vol. 63. No. 13. pp. 1090–1093.

(iii) **A Statistical Study of the Relation of Pellagra to Use of Certain Foods and to Location of Domicile in Six Selected Industrial Communities.**—*Archives of Internal Med.* 1914. Sept. Vol. 14. No. 3. pp. 293–373. With 29 figs.

These three papers are the first fruits of another year's careful work in Spartanburg County, South Carolina, where 847 pellagra cases were traced, together with all data concerning their homes, occupation, lives and diet. Fourteen patients were transferred to the Post-Graduate Hospital in New York for observation and treatment. Doubtless full records will be published later; all we are told now is that all the 14 returned home free from active manifestations of pellagra. Two died during the following winter from other causes, and one could not be traced; of the remaining 11, eight relapsed at home and three were free from recurrence during 1913.

[We are not yet told whether upon their return home they reverted to their former conditions of food and life.] The Commission has continued the work of 1912, so that the observations of that year have been supplemented and extended. We regret to read that "the metabolism studies of 1912 had yielded definite negative information and seemed to be sufficiently complete and were therefore discontinued." No evidence was obtained to incriminate maize-meal in the county and restriction of the use of it has not proved effective as a prophylactic against pellagra. Six mill villages, inhabited by 861 families, of which 140 contained one or more pellagrins, were investigated to see whether the consumption of fresh meat had any etiological bearing on the disease. In three of these villages there was no one who was in the habit of eating meat every day, while in the other three villages the daily meat-eaters numbered 29, 2 and 51. This rarity of fresh meat consumption looks at first sight like evidence in favour of deficient nutrition, but this is not borne out by the figures. The 82 who ate fresh meat every day provided four pellagrins or 4·88 per cent., while 263 persons who never ate meat at all were found to have 1·52 per cent. of pellagrins. On the other hand the villagers who drank milk every day were the least likely to contract pellagra, for only 43 out of 3,130 acquired it during the two years, *i.e.*, 1·37 per cent. Of those who never drank milk 5·43 per cent. became pellagrous. Though disagreeing with the theory that pellagra is the direct result of a general deficiency in diet, "the theory that a deficiency in some special dietary constituent may cause pellagra seems worthy of much more attention."

It is to be noted that most of the families under study possessed small gardens and fresh vegetables were everywhere used in season.

The following conclusions are reached :—

"1. The large active foci of pellagra in Spartanburg County were found in and near the large centres of population, and particularly in the cotton-mill villages.

"2. Children under the age of 2, adolescents for about five years following puberty and adult males in the active period of life were least frequently affected by pellagra. On the other hand, women from 20 to 44 years of age, old persons of both sexes and children from 2 to 10 years of age were most frequently affected.

"3. No definite connection between occupation and the occurrence of pellagra has been found, although the high pellagra morbidity in the women and children points to the home as the place in which the disease is usually contracted.

"4. In the group of incident cases most thoroughly studied, evidence of close association with a pre-existing case was disclosed in more than 80 per cent.

"5. A house-to-house canvass of the homes of over 5,000 people living in six endemic foci of pellagra failed to disclose any definite relation of the disease to any element of the dietary.

"6. In these six villages new cases of pellagra originated almost exclusively in a house in which a pre-existing pellagrin was living, or next door to such a house, suggesting that the disease has spread from old cases as centres.

"7. So far as we have observed, pellagra has spread most rapidly in districts where insanitary methods of sewage disposal have been in use.

"8. Additional evidence has been obtained to support the conclusion that flies of the genus *Simulium* have nothing to do with pellagra.

"9. Animal inoculations and the experimental study of intestinal bacteria have not yielded conclusive results.

"10. The studies of the blood have shown a lymphocytosis in most cases, but have not disclosed any constant abnormality characteristic of pellagra.

"11. There is no evidence of inheritance of pellagra.

"12. The immediate results of hygienic and dietetic treatment in adults have been good, but after returning to former conditions of environment, most of the cases have recurred. In children, progonosis is very much more favourable."

F. M. S.

SILER (J. F.), GARRISON (P. E.) & MACNEAL (W. J.). **The Relation of Methods of Disposal of Sewage to the Spread of Pellagra.**—*Archives of Internal Med.* 1914. Oct. Vol. 14. No. 4. pp. 453–474. With 9 figs.

This paper is a part of the Second Progress Report of the Thompson-McFadden Pellagra Commission and details work undertaken because the authors were impressed with the possibility that insanitary disposal of sewage might be an important factor in the spread of pellagra. The methods of disposal of excreta were accordingly investigated with regard to most of the pellagrins in Spartanburg County. They recall the outbreak at the Peoria lunatic asylum, in spite of "a most excellent water-carriage system of disposal of sewage," where the pellagrins were two and a half times more frequent in the "untidy" wards than in wards housing patients with cleanly habits. The rapid disappearance of pellagra from this asylum occurred after all pellagrins in it were isolated.

The conclusions are as follows:—

"1. Pellagra morbidity was higher in congested communities using surface privies than in more sparsely settled districts in which similar methods for the disposal of excreta were employed.

"2. In the city of Spartanburg the endemic foci of pellagra were located in the districts in which surface privies were in use.

"3. In cotton-mill villages equipped with surface privies pellagra was found to be endemic and new cases of the disease arose there year after year.

"4. In two cotton-mill villages completely equipped with water-carriage systems of sewage disposal it was impossible to find cases of pellagra which had certainly originated there, although some cases which had originated elsewhere were present.

"5. There is some evidence that pellagra spreads in hospitals for the insane more readily in the wards housing untidy patients.

"6. This study indicates that methods of disposal of human wastes may prove to be a determining factor in the spread of pellagra in certain communities and it suggests a possible method of prophylaxis, which is now being tested in a practical way."

F. M. S.

LORENZ (W. F.). **The Cerebrospinal Fluid in Pellagra.**—*U.S. Public Health Rep.* 1914. Sept. 11. Vol. 29. No. 37. pp. 2360–2363.

The author examined 153 times, by lumbar puncture, 106 cases of pellagra in the Georgia State Sanitarium. The series included all types, mostly very acute cases with severe mental and physical manifestations, and on some of these a second puncture was made after the acute condition had subsided. The series also included cases which showed very little or no mental disturbance. The routine examination consisted of a cell count, an estimation of the globulin and Wassermann's and Lange's tests. Eight cases gave a lymphocytosis ranging from 20 to 60 cells per cmm., and were all positive to Wassermann with both spinal fluid and blood serum; they were therefore held to be pellagrins with syphilis as complication. The only other cases which were positive to Wassermann were two dying pellagrins in whom no history or other evidence of syphilis could be obtained.

> "The absence of any evidence in the form of a lymphocytosis or an increase of any of the nucleated elements of the spinal fluid points to the absence of an infection with inflammatory lesions in close proximity to the circulating (cerebrospinal) fluid."
>
> "Summarizing the results of this investigation, the following conclusions are offered:—
>
> "1. A lymphocytosis of the cerebrospinal fluid does not occur in uncomplicated pellagra.
>
> "2. Globulin excess of the spinal fluid is only occasionally observed.
>
> "3. Lange's colloidal gold chloride test is uniformly negative in pellagra.
>
> "4. The Wassermann is negative with a few exceptions. In this investigation the exceptions were moribund cases which gave weakly positive reactions with blood serum.
>
> "5. The spinal-fluid findings would seem inconsistent with a conception that pellagra is an infectious disease of the central nervous system."

F. M. S.

Rossi (O.). **On the Aetiology of Pellagra and its Relation to Psychiatry.**—*Amer. Jl. of Insanity.* 1912–1913. Vol. 69. No. 5. (Special No.) pp. 939–964.

The author begins and ends this address, delivered to the Psychiatric Clinic of the Johns Hopkins Hospital, by confessing that the problem of etiology is still unsolved and that alienists know very little about the mental changes in pellagra. He reminds us of the principal objections to the various maize theories and also disbelieves in the views which blame schizomycetes, hyphomycetes and protozoa. He recognizes the great importance of collateral causes such as poor economic and hygienic conditions, and claims support from the two facts that pellagra in Italy is on the decrease and that it disappeared from the province Les Landes soon after the soil had been made fertile and the general prosperity of the inhabitants had been raised. He holds "that the pathological anatomy of pellagra in general and especially the changes in the central nervous system have more the stamp of an intoxication than of an infectious process." He states that the Government Pellagra Commission in Italy could not find any connection between simulia and pellagra, nor could it find any cases of the disease among infants, nor among the superintendents of labourers, who are often bitten by simulia while working with the peasants in the fields.

F. M. S.

Alessandrini (Giulio) & Scala (Alberto). **Contributo Nuovo alla Etiologia e Patogenesi della Pellagra. Memoria.**—*Annali d'Igiene Sperimentale.* 1914. Vol. 24. (New Series.) No. 1. pp. 1–175. With 18 plates and 30 figs. and Reprint. Roma: Tipografia Nazionale di G. Bertero E. C.

Professor Alessandrini, since 1909, has made up his mind that (1) pellagra is not entirely dependent upon a maize diet, and (2) it is a strictly localized disease and limited to those areas where water si drunk which has been almost exclusively in contact with a clay soil.

He then supposed on scanty evidence that pellagra was caused by a parasite of the filarial family. Now he has enthusiastically embraced the view of Professor Scala that silicic acid in a colloidal state in drinking water can produce a chronic intoxication which is something like pellagra. In Rome, 94 experiments were conducted on guinea-pigs, rabbits, dogs, and even on some monkeys, and consisted chiefly in the administration of silica in colloidal solution and in a gelatinous state by mouth, and by subcutaneous and intraperitoneal injections. The effect on the animals was a series of symptoms and a few pathological lesions which the authors maintain are similar to those observed in pellagra. [In the tabulated symptoms no importance is drawn between the typical classical signs and those rarer ones which sometimes accompany a case. The authors' work has already been reviewed in this *Bulletin*. See Vol. 2, p. 487.]

They found that silica acts on animals indirectly rather than directly, and that its effects could be neutralized by intramuscular or subcutaneous injections of neutral citrate of sodium. They therefore suggest that human pellagra should be treated by tri-sodic citrate (10 per cent. solution hypodermically) in daily doses of 1 cc., the chlorine elimination being checked by regular examination of the urine. Details are given of ten cases so treated, and all of them gained slightly in weight. Photographs of the face and hands of the tenth insane woman are published to show how the eruption disappeared after 24 daily injections in May and June. [For generations it has been suspected that a deficiency of salt may be one of the factors predisposing towards pellagra.] F. M. S.

HUNTER (S. J.). **The Sandfly and Pellagra.** 3.—*Jl. Economic Entomology.* 1914. June. Vol. 7. No. 3. pp. 293–294.

The Board of Education in Kansas is trying to obtain evidence which will confirm or refute the Sambon theory, and the author is responsible for the entomological side of the question. In August, 1913, the *Simulium vitattum* was studied in Southern Montana. It was noted that the bite of the fly could not always be felt by the victim. A monkey which was several times inoculated from the sandfly, the latest date being December 22nd 1912, began in November 1913, "to show a marked stomatitis accompanied by a diarrhœa. She has continued to lose in weight and the colour of the face is changing from the normal to a pale ashy gray. This is simply a report of progress, and as the author views it, does not warrant any conclusion for or against the Sambon theory." F. M. S.

i. BALP (Stefano). **Le Scuole d'Igiene e di Educazione Domestica nella Lotta contro la Pellagra.** [Schools of Hygiene and Domestic Instruction in the Contest against Pellagra.]—*Rivista Pellagrologica Italiana.* 1914. Mar. Vol. 14. No. 2. pp. 18–22.

ii. FRANCHETTI (Augusto). **Ricerche intorno alla Pellagra nei Bambini** [Researches on Pellagra in Children.]—*Ibid.* pp. 22–27.

iii. ANTONINI (G.). **Il piu grande Studioso della Pellagra.** [The Greatest Student of Pellagra.]—*Ibid.* pp. 29–30.

i. A series of general remarks on the subject indicated by the title of the paper.

ii. The report of a statistical enquiry set on foot by the Pellagra Commission to test SAMBON's theory that pellagra, if due to the bites of insects, ought to be an extremely common malady amongst children. For this purpose about 9,000 infants, up to 18 months of age, were examined in various pellagrous districts of the province of Venezia, about 2,000 in that of Verona, and so on throughout 34 of the Italian provinces, with the result that nothing was found to support SAMBON's contention.

iii. A sarcastic article ridiculing the application of the above title to Dr. SAMBON by a writer in the *Tribuna* of Rome.

J. B. N.

PAGE (Boney Wells). **Is Pellagra due to an Intestinal Parasite?**—*Amer. Jl. Public Health.* 1914. Oct. Vol. 4. No. 10. p. 933.

The author is described as "whole-time County Health Officer of Robeson County" in North Carolina. In the faeces of 17 pellagrins he has found an animal parasite, which appears in three different forms: an oval form resembling an amoeba, which often changes its shape into a bacillus, while "either of these forms may change into the third form, that of a spirilla" [*sic*]. "The parasite may be found in faeces several days old."

[Possibly the last quotation supplies the answer to the author's question.]

F. M. S.

TIZZONI (Guido). **La Pellagra in Bessarabia.**—*Rivista Pellagrologica Italiana.* 1914. Nov. Vol. 14. No. 6. pp. 81–82.

The author announces that from a further series of 12 cases of pellagra examined by him in Bessarabia he has been able to isolate the pleomorphous bacillus already described by him. [See this *Bulletin*, Vol. 4, p. 284.]

J. B. N.

LOWERY (J. R.). **Pellagra.**—*Med. Record.* 1914. Aug. 29. Vol. 86. No. 9. (Whole No. 2286). pp. 378–379.

The author, after five years' experience of pellagra in North Carolina, is convinced that the disease is due to the absorption of poisons from the intestines. He also believes that pellagra is now met with because modern bread is made from flour from the roller mill and does not contain the bran, which is necessary as a stimulus to intestinal action. Three quarters of his cases have been in women who had borne a child within one year before the first symptoms occurred. He does not say how many cases he has treated, but 24 per cent. of them died. For treatment he believes most in a change of diet, aided by large doses o arsenic.

F. M. S.

LAVINDER (C. H.), FRANCIS (Edward), GRIMM (R. M.) & LORENZ (W. F.). **Attempts to transmit Pellagra to Monkeys.**—*Jl. Amer. Med. Assoc.* 1914. Sept. 26. Vol. 63. No. 13. pp. 1093–1094.

Since 1910 many unsuccessful attempts to inject monkeys have been made, with only one positive result. Dr. HARRIS claims to have produced pellagra in a monkey by the inoculation of a Berkefeld filtrate derived from human lesions. The present authors thought that the problem should again be attacked and as exhaustively as possible. This is a preliminary report upon work begun in August, 1913, at a Government laboratory in Savannah, on 77 Rhesus monkeys, two Java monkeys, and three female baboons. Already 103 times material collected from pellagrins during life or after death has been introduced into the stomachs of animals, 52 times pellagrous fluids have been injected and 96 experiments have been made by injecting extracts, suspensions, or emulsions of pellagrous tissue. Eight animals have died, none with pellagrous symptoms. The survivors, excepting one, have shown no signs of pellagra. This monkey was injected intraspinally with 6 cc. of spinal fluid on April 14th, 1914, and again on May 2nd intraspinally with 4 cc. of spinal fluid drawn from another pellagrin. On May 4th, it was noticed that the right forearm was slightly swollen and the following day similar signs appeared in the left forearm. Both forearms then became entirely denuded of hair, "the skin became roughened and scaly with large cracks in which appeared a slight serous exudate." The bowel movements were occasionally loose. When the authors wrote they reported "the monkey is now again in his usual condition." They decline at present to express any opinion as to whether this one case adds any evidence towards communicability of the disease. Cerebrospinal fluid collected during life from 19 pellagrins, and not Berkefeld filtered, was injected intraspinally into 19 monkeys, of which one is evidently the animal reported upon. [The details which are given show that the experiments are being conducted very thoroughly and it is to be hoped that they will be continued until a result can be proclaimed.] F. M. S.

VOLPINO (G.). **Sul Valore Diagnostico della Pellagrogenina.** [The Diagnostic Value of Pellagrogenin.]—*Rivista Pellagrologica Italiana.* 1914. May. Vol. 14. No. 3. pp. 33–34.

The author applies the term "Pellagrogenin" to an aqueous extract of maize prepared by maceration for several hours at a temperature of 55–60° C., and then concentrated and precipitated with alcohol. The dry powder thus obtained is dissolved for use in water in the proportion of 1 : 100, and after sterilization at 115° C. is injected into the gluteal muscles in doses of 1 cc. of the solution. A reaction follows in the subjects of pellagra, which the author regards as diagnostic of the disease. J. B. N.

VOLPINO (G.). (i) **Sulla Presenza di Sostanze Protettrici nella Cariosside di Grano-Turco e sulla Reazione di Ipersensibilità dei Pellagrosi.** [On the Presence of Protective Substances in the Epidermis of Maize, and on the Hypersensibility Reaction in Sufferers from Pellagra.]—*Pathologica.* 1914. Mar. 15. Vol. 6. No. 129. pp. 147–148.

(ii) **Ancora sulla Ipersensibilità dei Pellagrosi verso gli Estratti Maidici.** [Further Remarks on the Hypersensitiveness of Sufferers from Pellagra to Extracts of Maize.]—*Ibid.* June 1. No. 134. pp. 300–302.

Two brief communications in answer to the criticisms of CESA-

BIANCHI (see this *Bulletin*, Vol. 4, p. 283) on the author's previous work on this subject. The author believes that the difference between CESA-BIANCHI's results and his own is due to the difference in the temperatures employed in making the extracts. His own infusions were made at a temperature of 55–60° C. J. B. N.

VOLPINO (G.). **Il Monofagismo ed i soui Rapporti con le Malattie Popolari della Pellagra, dello Scorbuto e del Beri-beri.**—*Rivista Pellagrologica Italiana* 1914. Mar. Vol. 14. No. 2. pp. 17–18.

Il Monofagismo ed i suoi Rapporti con la Pellagra.—*Gazz. Intern. Med. Chir. Igiene.* 1914. Apr. 4. No. 14. pp. 313–318.

The professor draws attention to the writings of FUNK on beri-beri and vitamines and to those of HOLST and FROELICH on scurvy, and he seems now to be converted to the idea that pellagra is a disease caused by a one-sided dietary. He even groups these three complaints in the following order: pellagra, beri-beri, scurvy. Of laboratory animals he says guinea-pigs are the most sensitive to a one-sided diet, such as wheat, maize, rice, potatoes, cabbage, peas or beans. Each group fed on one of these articles plus water died, and the earliest to succumb were those fed only on cabbage, or peas or potatoes. Before death he found the guinea-pigs all suffered from loss of weight and loss of appetite. He insists again upon the importance of the reaction of hypersensibility in the diagnosis of pellagra, and because he finds that an aqueous extract of healthy maize obtained at 55°–60° C. produces no reaction on pellagrins when injected subcutaneously, whereas a similar extract made at 30° C. gives a strong reaction, he argues that there is a vitamine in the former which does not exist in the latter. Among other experiments he fed 20 guinea-pigs on grass and maize for 40 days and then fed them on maize only; 20 others were fed on ordinary diet [not described] without maize and were then changed to an exclusive maize diet; the first group resisted the exclusive diet for an average of 30 days longer than the second group.

F. M. S.

CARBONE (Dominico) & CAZZAMALLI (Ferdinando). **Studi sulla Eziologia della Pellagra. Nota Seconda.**—*Giorn. d. R. Soc. Italiana d'Igiene.* 1914. Jan. 31. Vol. 36. No. 1. pp. 4–14; Feb. 28. No. 2. pp. 51–63; Mar. 31. No. 3. pp. 99–109; Apr. 30. No. 4. pp. 151–157; May 31. No. 5. pp. 213–222. With 6 figs.

An exhaustive series of experiments, undertaken with the object of producing symptoms of pellagra in rats by feeding them upon maize, which was first sterilized by washing with water and alcohol, and then infected with different moulds (*Mucor*, *Trichoderma*). The results do not seem to have been very conclusive, as most of the symptoms produced can be evoked in rats by feeding them with several other deleterious substances, as the authors admit. The paper, being very long and principally composed of tables, does not lend itself easily to condensation, and should therefore be consulted at first hand by those interested in its subject.

J. B. N.

Frazer (T.). **Mental and Nervous Manifestations of Pellagra.**—*Med. Record.* 1914. July 11. Vol. 86. No. 2. pp. 65–67.

The author now finds, from a large experience in North Carolina, that it is sometimes possible to diagnose early pellagra from the patients' sensory symptoms without waiting for symmetrical dermatitis. His country patients complain of pain or aching in the back, legs or feet, some say their " joints tingle." Their heels or elbows feel " as if in hot ashes." Headache, giddiness and " throbbing in the ears " are also met with, while others complain of stiffness, weakness of legs and tremors, so that one stated: " As soon as I do anything I get all in a quiver." Sleeplessness, loss of interest, lack of self-control, and irritability precede mental depression, and are followed by a general air of apathy, expressionless features and " the lifeless monotone of the voice." He does not find that increased knee jerks are a reliable help for diagnosis.

F. M. S.

Macdonald (J. B.). **Pellagra and its Symptoms: the Importance of Mouth and Gastro-intestinal Lesions.**—*Boston Med & Surg. Jl.* 1914. Sept. 24. Vol. 171. No. 13. pp. 485–489. With 7 text figs.

This is a good account of pellagra, read before the members of a Dental Society, and stress is laid upon the importance of detecting changes in the delicate mucous membrane of the mouth as readily as those in the skin. " The disorders of sensation are usually first noticed, and are more severe in the mouth and stomach." Since April 1913, six pellagrins have been seen in the Danvers State Hospital, to which the author is attached, and none of them were diagnosed before admission. The burning feeling in the mouth and stomach were often referred by the patients to something about the teeth; one formed the idea that a tooth filling had lodged in her throat and insisted upon an X-ray examination. " Another believed that the material used in filling her teeth had poisoned her mouth and given rise to all her discomforts."

F. M. S.

Brengle (Deane R.). **Pellagra in Minnesota.**—*Jl. Amer. Med. Assoc.* 1914. Oct. 3. Vol. 63. No. 14. pp. 1157–1159. With 1 text fig.

This is an account of a Cuban pellagrin, who had resided in different parts of the United States for 31 years. He volunteered that, while in railroad camps, he had eaten quantities of bread made from maize " and that the meal often became mouldy from being kept in the damp store-car." The symptoms were typical, with the addition of enlargement of the epi-trochlear glands; there was no appearance of syphilis and two Wassermann tests were negative. Great improvement, physically and mentally, took place during seven weeks in hospital, where he was treated with rest, nourishing diet and Fowler's solution. The author says that only four cases have previously been reported in Minnesota, but he believes that many undiagnosed cases may exist.

F. M. S.

MILLER (Henry W.). **Report of a Case of Pellagra in Maine with Remarks upon Recent Work on the Etiology of the Disease.**—*Amer. Jl. of Insanity.* 1913. Jan. Vol. 69. No. 3. pp. 551–557.

This seems to be a case of pellagra, which is reported chiefly because the disease is very rare in the New England States. The reporter shows that maize hardly entered into the patient's diet, but he does not seem to have investigated the diet at all carefully. For instance, "the family were in comfortable circumstances," yet the patient, who when not living at home was a waitress, only had meat once a week and fish two or three times a week.

The patient starved herself and had mental symptoms two years before she developed any skin lesions. Quotations are given from a few of the many authors who write on the etiology of pellagra.

F. M. S.

HUNTER (George G.) & WILLIAMS (Edward Huntingdon). **The Widening Pellagra Zone.**—*Med. Record.* 1914. Oct. 31. Vol. 86. No. 18. (Whole No. 2295). pp. 757–759.

Writing from Los Angeles, California, the authors point out that well-marked pellagra is not only increasing its territory, but invading classes in the United States which have hitherto remained practically immune.

Unfortunately the two "typical" cases which they report were complicated by other diseases, and are not convincing. Two years ago a woman began to suffer from severe pain in her muscles and joints, which crippled her when she was in a state of nervous prostration, due to nursing a sick child by day and night. She then developed delusions and hallucinations, followed shortly before death by diarrhoea, aphthous sores of mouth, inflammation, and swelled about the vulva. Two weeks after the onset of diarrhoea, she developed a symmetrical pigmentation, like sunburn, over the knuckles of both hands, the nose, chin and cheeks. The muscles, especially of the legs, were exquisitively painful, so that opium was required; the pupils were small and re-acted very slowly to light; the knee jerks were absent. [There was apparently no autopsy.] The second case, an unmarried woman teacher, had always been considered "queer" and had suffered from a nervous breakdown and recurring mental depression. Her symptoms during the last two years began with severe pain in the muscles of the back, insomnia, and threatened suicide. A year after the onset of this illness, she had marked pigmentation, like a very severe sunburn, over the forehead, cheeks, nose, knuckles of both hands, a severe cystitis, diarrhoea, extensive ulceration of the mouth and inflammation of the genital mucous membrane. [The end of this case is not recorded.] The authors lay stress on the fact that these two patients did not belong to the poverty stricken class. [Not a word is said as to whether they took a good diet or not, or whether they gained or lost weight, though they belong exactly to the type of patients who are likely to have lived on insufficient diet.]

F. M. S.

BABCOCK (J. W.). **Medico-Legal Relations of Pellagra.**—*Southern Med. Jl.* 1914. Oct. 1. Vol. 7. No. 10. pp. 771–778.

The author, who writes from the double standpoint of a mental specialist and of the chief pioneer of pellagra discovery in the United States, says that it was LEGRAND du SAULLE in 1862 in France who first directed attention to the irresistible impulses towards homicide and suicide from which some pellagrins suffer. The author says that this side of the question has not attracted much attention yet in America, but from press clippings in a Government office he is enabled to give a long list of threatened or successful homicides, suicides, self-mutilations and delusions of the lying-in-state among non-pregnant women. Every reader of pellagra literature must know how common it is for patients to think they will rid themselves of burning sensations in the skin, throat or stomach by jumping into a cool stream or well. [In Egypt, during 1913, there were six murders committed by lunatics at large and four of them were undiagnosed cases of pellagra. Pellagra is now the greatest cause of insanity in Egypt and of deaths among the insane. It accounts for over 17 per cent. of the admissions and one third of the deaths in the Government Asylum.]

F. M. S.

MITCHELL (J. A.). **A Case of Pellagra in a Transkeian Native.**—*S. African Med. Record.* 1914. Oct. 10. Vol. 12. No. 19. pp. 341–342.

The patient was originally thought, soon after entry to a convict prison in 1911, to be suffering from scurvy and spongy gums. Two years later he was admitted to hospital with "large blebs on both hands, including fingers and thumbs," and partial hemiplegia and macular patches which caused his case to be diagnosed as anaesthetic leprosy. In December 1913, when he was first seen by the author, he had "partial paralysis of the muscles of the extremities" and scaly dermatitis of face, feet, legs, forearms and back. The patches were anaesthetic, the legs were completely anaesthetic below the knees and the upper limbs anaesthetic for the lower two thirds. There was rhinitis, with much nasal discharge, necrosis of bone, and foul breath, but no leprosy bacilli could be found in smears from the nasal secretion. In January "the hands were completely flaccid and paralysed, with complete wrist drop and wasting of the hand muscles." Thereupon the Kaffir was found by three doctors to be suffering from pellagra. [It is not stated why the diagnosis of leprosy was abandoned.]

F. M. S.

RUBINATO (Giovanni). **Alcuni Casi di Pellagra con Sindrome Addisoniana.** [Some Cases of Pellagra presenting Symptoms of Addison's disease.]—*Riv. Crit. di Clin. Med.* 1914. Jan. 31. Vol. 15. No. 5. pp. 65–74.

An account of four cases of pellagra in which there was bronzing of the skin and great prostration in addition to the other symptoms of pellagra. Three of the patients lost these symptoms after treatment in hospital, but the fourth one died. An exhaustive account is given of the post mortem appearances in the fatal case. The suprarenals were found to be enlarged and fibrous with a certain amount of hypertrophy of the cellular elements, but as far as can be judged from the description given the appearances were not those seen in genuine Addison's disease. The complication is discussed at length.

J. B. N.

Box (Charles R.). **English Pellagra in early Childhood.**—*Brit. Med. Jl.* 1914. Aug. 29. p. 397. With 2 figs.

This case is interesting because the eruption occurred in a child, in Yorkshire, at the age of 20 months, and appeared again during the spring months of three successive years. There were also mental irritability, disturbed sleep, incontinence of urine and pronounced tremor of hands, arms and head, with occasional small jerky movements of the limbs. Maize flour had never formed part of the diet, "which appeared suitable for her age." The child was suckled for the first year of life and the mother is said to have been strong and healthy.

F. M. S.

Little (E. G. Graham). (i) **Pellagra with Skin Eruptions.**—*Proc. R. Soc. Med.* (Dermatological Section). 1914. July. Vol. 7. No. 9. pp. 238–244. With 2 coloured plates & 1 chart.

(ii) **Case of Pellagra with Skin Eruptions.**—*Brit. Jl. Dermatology.* 1914. Aug. Vol. 26. No. 8. (No. 310). pp. 313–319.

This is another English case which the reviewer had the opportunity of seeing with the author at St. Mary's Hospital. The patient suffered originally from diarrhoea, pleurisy with effusion, and enlarged mesenteric glands, so that he was believed to be tubercular at the age of 16, and was treated at home on a plentiful diet with fresh air and rest.

When admitted to the hospital he was suffering from multiple peripheral neuritis, wrist drop, foot drop, palsy of diaphragm and absence of all deep reflexes except jaw-jerk, transient lateral nystagmus, oedema of legs, dilatation of heart, pulse 156 and a tricuspid murmur. He had peculiar walnut-coloured pigmentation of the back of the hands and wrists and similar patches on the neck, forehead, and nose, while there was deep pigmentation of the penis, scrotum and sacrum. A year before admission and before the onset of the diarrhoea he was "stung by some fly, not identified, on the shoulder and scrotum," while bathing in the river.

F. M. S.

Voegtlin (Carl). **The Treatment of Pellagra.**—*Jl. Amer. Med. Assoc.* 1914. Sept. 26. Vol. 63. No. 13. pp. 1094-1096.

The Professor of Pharmacology to the United States Public Health Service reminds us that mild cases of pellagra will get well in a short time if they are treated in hospital with rest and a liberal mixed diet, containing plenty of fresh meat. Even cases complicated by diarrhoea should not have their diet reduced, "as it has been found through metabolic studies that the assimilation of the food is unimpaired in this condition." He bewails the fraudulent advertisements of proprietary pellagra medicines throughout the Southern States, each promising positively to cure pellagra. Some of these mixtures, analysed at the Hygienic Laboratory, were found to contain charcoal, iron or quinine, and were sold at exorbitant prices. He believes that pellagra is a chronic intoxication, possibly associated with the large amounts of soluble aluminum compounds which are present in vegetables. In a footnote he draws attention to ALESSANDRINI and SCALA's paper reviewed on p.58 of this *Bulletin*. He sums up the points which require investigation as regards etiology of pellagra as follows :—

" 1. A deficiency or absence of certain vitamins in the diet.

"2. The toxic effect of some substances, as aluminum, which occur in certain vegetable food

" 3. A deficiency of the diet in certain amino-acids."

F. M. S.

LORENZ (W .F.). **The Treatment of Pellagra. Clinical Notes on Pellagrins receiving an Excessive Diet.**—*U.S. Public Health Rep.* 1914. Sept. 11. Vol. 29. No. 37. pp. 2357–2360.

A ward of coloured female pellagrins in the Georgia State Sanitarium was placed under the author's supervision for eight weeks. He treated by diet alone and without arsenic or other tonics 27 acute cases of pellagra; 7 died, 3 were unchanged, 13 improved, and 4 recovered, so that all pellagrous symptoms had disappeared and the mental condition had cleared up entirely. Two of the seven fatal cases were complicated by heart disease and one had phthisis in addition; two others were unusually severe, " with extensive sloughing of the skin involved and severe stomatitis, salivation and persistent diarrhoea." The excessive diet consisted chiefly of two to four eggs, a quarter of a pound of fresh beef (twice a day), fresh vegetables, 16 ounces of milk, besides milk with coffee and porridge and extra milk between meals whenever the patient desired a drink. An improvement was seen in about four weeks, mental and nervous symptoms changed, bowel conditions improved, diarrhoea was not aggravated, and the skin manifestations were the last to disappear. Some of the insane patients required considerable urging to take this unaccustomed liberal diet. [This experiment would have met with even greater success if the patients had not been insane and had not been so acutely ill.]

F. M. S.

GOLDBERGER (Joseph), WARING (C. H.) & WILLETS (David G.). **The Treatment and Prevention of Pellagra.**—*U.S. Public Health Rep.* 1914. Oct. 23. Vol. 29. No. 43. pp. 2821–2825.

These Government officials have made up their minds that pellagra is neither infectious nor contagious, but is essentially of dietary origin and " that it is dependent on some yet undetermined fault in a diet in which the animal or leguminous protein component is disproportionately small and the non-leguminous vegetable component disproportionately large." In confirmation of their emphatic statement they point out that no man in the United States or Italian Army has developed pellagra, unless he had it before enlisting. [It is believed that this is also true of the Egyptian Army.] They allow that pellagra is not a disease of mal-nutrition, provided that this term be used as defining some degree of starvation. But recent studies, which have definitely established beriberi as a "deficiency" disease have opened up new possibilities with regard to the etiology of pellagra. In answer to enquiries they recommend that pellagrins should be fed (if necessary by tube) on an abundance of fresh milk, say two pints, four eggs daily, half a pound of fresh lean beef, beans and peas, which must be fresh or dried and not preserved in tins. They emphasize that diarrhoea is no contra-indication to the full feeding. It is advised that no maize products should be given, and that a reduction of carbohydrates may be advisable. Patients in the acute stage should be protected from the sun. But the important thing is "to correct the dietary eccentricity of the affected individual."

In lunatic asylums, where the diet prescribed is often ample, it is of the highest importance to see that the individual patient actually eats the food provided. The authors state from personal observation that some inmates do not eat the food on their plates, either as a consequence of their delusions or because other inmates steal it. [This is a very valuable paper, which should be widely read.]

F. M. S.

Wilson (W. T.). **Preliminary Report of 20 Cases of Pellagra treated with Picric Acid.**—*Med. Bull. of the Harris County Med. Soc.* 1914. July. Vol. 7. No. 2. pp. 24–25.

The author knows of 35 cases, mostly negresses, who are undergoing this treatment in Texas. Some have lost all symptoms in periods varying from 30–50 days, others have only been under treatment for two or three weeks and are said to be "improving." The first case was only treated on May 4th 1914. But there was one negress, age 28, who began treatment on June 20th with eruption, and symptoms referred to mouth and intestines and "mind affected." Yet 17 days later the notes say "no symptoms, mind normal 7 days."

The rash is treated with gauze, soaked in a saturated solution of picric acid, and a weak solution is used as a gargle and administered internally, and no toxic effects were noticed. The author also wishes to know if any other pellagrins have been bitten by a spider, because in two of his patients with this history pellagra appeared within 14 days!

F. M. S.

Robinson (Roy F.). **Treatment of Pellagra.**—*Kentucky Med. Jl.* 1914. Sept. 15. Vol. 12 No. 18. p. 578.

The author says, "believing this to be a protozoal disease, I decided to use bichloride of mercury externally." In three weeks the dermatitis of 13 cases had practically disappeared, but for two additional weeks the drug was also given internally and then the diarrhoea also vanished.

[The merit of this paper is its brevity.]

F. M. S.

KOZOVSKY (A. D.). **Sur la Morphologie du Sang dans la Pellagre.**— *Nouvelle Iconographie de la Salpêtrière.* 1914. Mar.-Apr. Vol. 7. No. 2. pp. 94–102.

The author writes from the laboratory of the Bessarabia Government Lunatic Asylum at Kostingeni, and has examined the blood of 21 pellagrins, without mental symptoms, in neighbouring villages and 31 insane pellagrous patients in the asylum. He gives no figures as the result of his labour, contenting himself with noting, for instance, that Case 11 showed " large mononuclears, Fürex cells and leucocytes with vacuoles." He finds that large and small lymphocytes are in greater number in insane than in sane pellagrins; he did not find any eosinophiles and in some instances he found many mast cells. In the spleen of one fatal case he found bacilli and cocci which he thinks resembled those described by TIZZONI.

F. M. S.

RIVISTA PELLAGROLOGICA ITALIANA. 1914. Sept. Vol. 14. No. 5. pp. 69–70. **Una Proposta del Profr. Devoto.** [A Proposal by Professor Devoto]

A proposal that at the coming Pellagrological Congress at Verona, in 1915, there should be an exhibition of as many cases as possible of pellagra in which alimentation with maize can be definitely excluded as the cause of the disease, for examination by the experts present. The proposal is warmly supported by the Editor of the Review.

J. B. N

BOOK REVIEW.

WU LIEN-TEH (G. L. TUCK) [M.A., M.D., B.C.]. [Edited by]. **North Manchurian Plague Prevention Service Reports (1911-1913).**— vi+187 pp. With 1 map, 4 charts & 23 plates. 1914. Cambridge: at the University Press. [Price 10/6 net.]

These collected reports include the First Report of the North Manchurian Plague Prevention Service, dealing with the Tarbagan (*Arctomys bobax*) and its relation to plague, which has been already noticed in this *Bulletin* [see Vol. 3, p. 202].

With regard to the progress of the work of the service, the chief points noted in the Annual General Report are (*a*) the establishment of the central office for the transaction of the administrative work of the service in the Customs building, Harbin ; (*b*) the opening of the Harbin Isolation Hospital for treatment of patients ; (*c*) the completion and opening of the Lahasusu and Sansing Hospitals; and (*d*) the progress towards completion of the Taheiho Hospital.

The fourth report deals with the histology of pneumonic plague. [The material available for examination was very scanty and its examination does not appear to have thrown much new light on the pathology of pneumonic plague.] The examinations of the various organs appeared to afford evidence of an extremely acute septicaemic condition, but the lung lesions were far less marked than was expected, although the presence of lobular pneumonia was clearly indicated. Acute bronchitis accompanied by collapse of lung tissue and catarrhal pneumonia was in evidence, and many of the alveoli were emphysematous or distended with a coagulated albuminous fluid. No evidence of the fibrinous pleuro-pneumonia described by other authors was present in the specimen examined, and the suggestion is made that the latter condition may indicate the presence of a primary pneumonia induced by massive infection, while the catarrhal pneumonia with bronchitis followed by oedema may be the result of a secondary pneumonia from septicaemic infection.

A large portion of the remaining Reports is devoted to administrative details, and include the Quarterly Reports and the Reports of the Harbin Hospital.

R. St. J. B.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. 5.] 1915. [No. 2.

YELLOW FEVER.

Yellow Fever Commission (West Africa).
i. **First Report.** 33 pp. 1914.
ii. **Second Report.** 147 pp. 1914. With 4 maps. Printed by Waterlow & Sons, London Wall, E.C.

i. The Yellow Fever Commission,* which was appointed by the Secretary of State for the Colonies " to study the nature and relative frequency of the fevers occurring among Europeans, natives, and others in West Africa, especially with regard to Yellow Fever and its minor manifestations," has published two Reports. In the first of these there are reviewed briefly the circumstances which led to the appointment of the Commission, and the steps which have been taken to organise the enquiry which it has been instructed to carry out. The Commission has power to appoint investigators to proceed to West Africa or elsewhere, to hold interviews with members of the West African Medical Staff and others likely to be of assistance, and to present Reports from time to time which are to be submitted to the Advisory Medical and Sanitary Committee for Tropical Africa for transmission to the Secretary of State.

The general nature and scope of the enquiry will be best illustrated by reproducing here the section headed " Problems for Investigators," to be found on page 9, Appendix I. (*a*) of the First Report :—

" *Problems for Investigators.*—In the opinion of the Sub-Committee, the following are some of the problems to which the attention of those engaged in the work of the Commission in this country and elsewhere should be specially directed :—

" 1. The nature of the disease which during the years 1910–11–12 has been locally diagnosed as Yellow Fever, and which has been the cause of a heavy case mortality.

" 2. Was it probably the same disease which is recorded in literature under the name of Yellow Fever as having occurred from time to time in the West African Colonies ?

" 3. If this disease was not Yellow Fever was it (*a*) some other recognised disease, or (*b*) a disease of unknown nature ?

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* The members of the Commission were Sir J. K. Fowler (Chairman), Sir W. B. Leishman, Sir R. Ross and Professor W. J. Simpson.

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"4. What fevers are known to occur at the present day in epidemic form amongst (*a*) Europeans, (*b*) other non-natives, (*c*) natives in West Africa?

"5. What is the clinical course, probable pathology, and mode of infection in such fevers?

"6. What is the probable nature of the fevers which have been termed:—
(*a*) bilious remittent fever,
(*b*) malignant bilious remittent fever,
(*c*) inflammatory, endemial, or acclimatising fever,
(*d*) hyperpyrexial fever,
(*e*) three days' fever,
(*f*) seven days' fever,
(*g*) low fever,
(*h*) febricula?

"7. How can these fevers be distinguished from—
(*a*) Yellow Fever,
(*b*) Malaria,
(*c*) other known diseases?

"8. Do the following diseases occur in West Africa? If so, to what extent; and are they likely to be mistaken for other diseases of a fatal or mild character:—
(*a*) dengue fever,
(*b*) pappataci fever,
(*c*) typhus,
(*d*) Rocky Mountain fever,
(*e*) double continued fever,
(*f*) typhoid,
(*g*) paratyphoid,
(*h*) undulant fever,
(*i*) para-undulant fever and
(*j*) cerebro-spinal fever.

"9. What are the diseases to which may be attributed the large infant mortality rate amongst the natives?

"10. Is there any evidence that some or any of these diseases confer immunity to Yellow Fever, either (*a*) temporary or (*b*) lasting?

"11. Is there any evidence of—
(*a*) racial immunity,
(*b*) hereditary transmission of immunity?

"12. What is the nature of the virus of Yellow Fever?

"The Sub-Committee wish to make it plain that the foregoing is not a list of questions to which the Investigators will be expected to find answers, but merely an attempt to define and circumscribe the enquiry in detail."

ii. The Second Report opens with a short statement of the progress made by the various investigations in West Africa:—

"4. The epidemic of Yellow Fever which was in progress at Lagos at the date of their last report has not yet completely died out, and cases have also been reported from the following places:—Lagos, Ebute Metta, Warri, Forcados, Burutu, Onitsha and Calabar in Nigeria; Accra, Quittah and Saltpond in the Gold Coast; Kintampo and Ayinam (near Obuasi) in Ashanti; Bole and Tumu in the Northern Territories; Boia in Sierra Leone.

"The total number of cases to May 31st, 1914, is seventy. Of these 41 occurred in Europeans, including 4 in Syrians, and 29 in natives. Twenty-one cases amongst Europeans* and one case amongst natives proved fatal.

"5. Reports have been received from time to time from the Investigators appointed by the Commission who have been working chiefly at Freetown, Accra, Seccondee and Lagos. Special investigations have been carried out by them and also by other Members of the West African Medical Staff, into the possible mode of origin and the clinical features of the cases which have occurred at a distance from those centres of work. Two officers of the West African Medical Staff in succession have suffered from Yellow Fever at Bole, in the Northern Territories of the Gold Coast, but fortunately both cases ended in recovery. A fatal case in a European Officer has occurred at Tumu, close to the northern boundary of the Northern Territories, a distance of more than 430 miles in a direct line from the coast."

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* Three of these cases were Syrians.

The Commission then considers certain questions of a preliminary character which are closely associated with the main object of the enquiry. These are as follows :—

> "(A) An Historical Retrospect of the occurrence of Yellow Fever.
>
> (1) On the West Coast of Africa as a whole.
> (2) In the ships of the British Navy on the West African Station.
> (3) In each Colony, whether British or Foreign, on the West African Coast.
> (4) Health conditions in the West African Colonies in 1862.
> (5) An Analysis of the West African epidemics of 1910, 1911 and 1912.
>
> "(B) A consideration of the question of Racial Immunity to Yellow Fever and of the Clinical Types of that disease, as observed in whites and in coloured people.
>
> "(C) Yellow Fever in childhood and early life."

These form a series of most interesting and instructive articles which cannot be reviewed here in any detail. On the occurrence of yellow fever on the West Coast of Africa the opening paragraph of the article gives the general conclusion reached :—

> "A knowledge of the history of the West Coast of Africa as regards Yellow Fever is almost essential to a right understanding of the epidemics of the last four years (1910-1913) and conclusively proves that the recent experience is but a repetition of that of the past which, owing to a fortunate freedom from serious outbreaks amongst Europeans for a long period, had been forgotten and had almost been replaced by a belief that Yellow Fever did not occur on the West Coast of Africa."

Under the titles of "Racial Immunity" and "Yellow Fever in Childhood," two very important statements are made. Readers are reminded that during 1905 it was shown conclusively that negroes are about as liable to contract yellow fever as the whites, and that "No one now contends that the native population of West Africa is immune to yellow fever ; indeed, the evidence of their susceptibility obtained by the Commission is steadily increasing."

Accepting the statement of POTHIER that "it is remarkable how rarely children or young children die of yellow fever," the Commission remarks that if this statement is applicable to the native children of West Africa, it is not likely that it will prove an easy task to determine what proportion of such of the natives as now possess immunity to yellow fever acquired it in childhood.

With respect to the nature of the Seidelin bodies and their relation to yellow fever no definite statement is made. Decision is reserved for a future Report.

TABLE SHOWING THE INCIDENCE OF YELLOW FEVER IN THE WEST AFRICAN COLONIES AND SETTLEMENTS FROM 1900 TO FEBRUARY, 1914.

	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.	1911.	1912.	1913.	1914.
Sudan		+ +	+ +					+ +	+ +						
Senegal	+ +	+		+ +	+ +	+ +	+ +				+ +	+ +	+ +		
Gambia	+ +	—	—	—	—	—	—	—	—	—	—	+ +	—	—	
Portuguese Guinea											+ +	+ +	+ +	+ +	
French Guinea		+													
Sierra Leone	—	—	—	—	—	—	—	—	—	—	+ +	—	—	—	+
Liberia															
Ivory Coast			+ +	+ +	+	+					+ +				
Gold Coast	—	⊕ ⊕	+	+	+	+	+	—	—	—	+ +	+ +	+ +	+	+
Togoland						+ +	+ +	+ +			+ +			+	
Dahomey						+ +	+ +	+						+	
Nigeria, Southern	—	—	—	—	—	—	—	—	—	—	⊕		⊕	+ +	+ +
,, Northern	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cameroons	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Epidemic of Yellow Fever = + +
Yellow Fever Reported = +
Suspicious Cases = ⊕

Reported absent or not mentioned in report = —
No Reports received Blank.

The Report ends with a list of General Conclusions at which the Commission have arrived :—

" 1. That Yellow Fever has occurred from time to time since 1778 in various parts of the British West African Colonies.

" 2. That there is no evidence to show that the infection in each outbreak has been introduced from outside Africa.

" 3. The mild nature of the attack in certain cases of Yellow Fever makes the identification of such cases a matter of great difficulty. It is therefore essential that in the future all cases of fever should be carefully observed and classified in order that, so far as possible, such mild cases of Yellow Fever may not pass unrecognised.

" 4. The attention of all workers at this subject should be specially directed to the discovery of a clinical test for Yellow Fever. The Commission do not in the least degree underestimate the importance of the researches which they are prosecuting in connection with the nature of the virus, and also of research as to the appearances by which its presence could be recognised in the body of the mosquito; indeed, it is quite possible that by such researches the desired clinical test may be found, but the extreme practical importance of being able to determine whether a mild case of fever is or is not Yellow Fever, renders it essential that all possible methods should continue to be employed in the clinical study of the disease.

" 5. The Commission are of opinion that the day has gone by for endeavouring by the use of euphemistic terms to conceal the presence of Yellow Fever, and that the only hope of eradicating that disease lies in boldly facing the facts; also that failure to take all possible steps to destroy a focus of Yellow Fever is an offence against the comity of nations."

C. M. Wenyon.

Couvy (L.). **Un Cas de Fièvre Jaune chez un Indigène de la Côte d'Ivoire.**—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 552–554.

The author has recorded this case on account of the post-mortem findings, which appeared to be those of yellow fever. The patient was a native of the village Imperial, in the Ivory Coast of West Africa. He was employed as a shopman. He was first taken ill on April 13th, was worse on the following day, and suffered from fever for several days after this. He recovered, but suffered from a severe relapse and quickly went from bad to worse. He was seen on April 19th by the author, who was informed that he had passed bloody stools, and had vomited blood, both red and black.

When first seen the patient's condition was very bad. He could hardly speak. The conjunctivae were injected and ecchymosed, but not icteric; the tongue was white and dry; the abdomen tender on palpation; there had been no vomiting since the previous day, and no urine had been passed for a long time—only 5 c.c. could be drawn off by catheter, and this contained abundant albumin. The patient died six hours after this.

At the autopsy, performed fifteen hours after death, the conjunctivae were not coloured, but showed ecchymoses; the subcutaneous connective tissue was a deep yellow colour, which was specially evident on the parietal layer of the peritoneum. The heart and lungs appeared normal. The liver was of a marked chamois colour and in a very advanced condition of fatty degeneration; the lower surface of the liver was of a deep green lint, which contrasted with the colour of the rest of the organ. The mucous membrane of the stomach was hyperaemic and very vascular in places. The contents were a blackish liquid containing black granules. The small intestine was very hyperaemic and of a blackish colour, containing a dark liquid like that found in the stomach. A diagnosis of yellow fever suggested itself.

The relapse was attributed by the patient himself to a native medicament he had taken. He lived in the centre of the town in a house with his wife and son. Neither of these had been ill, nor had there been any case from which he could have been infected. He had never been sent on board a ship from the south. This case is then quite sporadic, and possibly followed on mild cases which had passed unnoticed.

The strictest measures of precaution were taken, with the result that no cases followed, so that this case remains a completely isolated instance of yellow fever if it really was of this nature.

C. M. W.

O'BRIEN (J. M.). **A Study of Some Cases of Yellow Fever in Guayaquil, Ecuador.**—*Ann. Trop. Med. & Parasit.* 1914. Dec. 15. Vol. 8. No. 3. pp. 369–378. With 1 plate.

The writer of the paper explains that the original purpose of his visit to Guayaquil was to gain some skill in the diagnosis of yellow fever in mild cases and in the early stages of the disease. Owing to the dryness of the season only twenty cases were seen, and of these only two could be considered as mild. Most of the cases, therefore, were severe and left no doubt as to the diagnosis.

Attention is called to one or two points. Abnormalities in the heart sounds are common; these may be mere alterations of sound or amount to actual bruits. They frequently disappear suddenly without any reference to the condition of the patient. Two post-mortems were performed. In one an aortic valve showed a penetrating ulcer of one cusp, and in the other there was a subendocardial haemorrhage on the ventricular surface of one flap. Icterus may be very slightly marked or only transient in well-marked cases of the disease. The liver is generally painful and the spleen too at times. Increase in the quantity of albumin in the urine as the temperature drops—a classical feature of the disease—is not of constant occurrence.

Blood examination.—The percentage of polynuclears is high, while the mononuclears are generally normal. Sometimes the lymphocytes almost disappear completely. Eosinophiles are frequently absent.

As regards the appearance of the polynuclears in stained films, the author writes:—"I am inclined to think that in a very large proportion of yellow fever cases these cells are actually degenerated." This is so marked on the fourth day of the illness as to be of diagnostic value. Similar degenerate polynuclears occur in other conditions, such as plague, dysentery, typhoid, malaria, pregnancy, but these cells are not affected in a wholesale manner as is the case in yellow fever.

The author then describes the change undergone by the polynuclears. About the third day some half of the cells lose the brown stippled staining reaction which their cytoplasm has towards Giemsa; by the fourth day almost all have lost it, and some have a cytoplasm which is hardly discernible. The nucleus during this stage remains normal. In the next stage the edges of the cell become torn and ragged, the nuclei splayed out and lightly staining, so that it may be difficult to recognise the nature of the cell. Later the cytoplasm contracts, becomes rounded and takes on a pink colour, while the nucleus is rounded, small and intensely stained. In the most advanced stage observed the nucleus is round, with perhaps one or two drop-shaped fragments of nuclear matter near it. The cytoplasm is circular and about twice the size of a red blood corpuscle. It has a pinkish stain. This form is sparsely scattered in the slides. In yellow fever the degeneration does not always advance to the second stage—vacuolation of the polynuclears is common, but not constant. A coloured plate illustrates these changes in the character of the polynuclears.

It is stated that a patient search was made for *Paraplasma flavigenum* but without success, but that its very minute size may have caused it to escape detection.

Attention is called to the natural immunity of very young children, a fact which is recognised by all the medical men in Guayaquil. With age the infancy immunity passes off and infection may occur. This may be an exceedingly mild attack, owing to a slight persistence of the infancy immunity, and thus individuals become immunised by infection with a dose of virus which would have produced severe attacks in the completely non-immune. Mention is made of two German girls who had lived in Guayaquil till four and five years of age, when they went to Germany. They returned to Guayaquil after six years' absence when, after a few months, both suffered from yellow fever. It is suggested that in young children the liver may play a part which it does not play in the adult, and that in this way the infancy immunity may be explained.

C. M. W.

LICEAGA (Eduardo). **Yellow Fever in Mexico.**—*Amer. Jl. Public Health.* 1914. Sept. Vol. 4. No. 9. pp. 786–787.

The author gives an account of yellow fever occurring in Mexico since his last report in August, 1912. During September, October and November six further cases (with two deaths) occurred in San Juan Bautista, after which the epidemic disappeared. During September and October some seven further cases (with two deaths) occurred in Frontera, presumably amongst the crew of the steamship "Walkyrian." During September two cases were found in Laguna del Carmen, one on board the steamship "Puebla," the other in the town. Since that time nine have occurred.

Five cases occurred in Merida in September and November, and another on April 8, 1913. Apparently the latter case was due to association with soldiers from Campeche. Accordingly an investigation was instituted at Campeche, with the result that new cases since May 29th numbered thirteen with seven deaths.

The total number of cases in the Mexican Republic from September 1st, 1912, up to date (September, 1913) has been forty-three, with twenty-six deaths.

In Vera Cruz no cases have occurred since February 11th, 1909, though this place was the seat of yellow fever for centuries. In Tampico the last case occurred on November 3rd, 1903. Therefore the only small focus of this epidemic disease is found in the port of Campeche.

All the measures against the disease which have been in practice since 1904 are in as full observance to-day as if yellow fever still existed on the Mexican coasts.

C. M. W.

SEIDELIN (Harald). **Transmission of *P. flavigenum* from Man to Guinea-Pig and from Guinea-Pig to Man.**—*Yellow Fever Bureau Bull.* 1914. Sept. 30. Vol. 3. No. 3. pp. 203–208. With 1 plate.

The author has inoculated himself with blood from a guinea-pig which was harbouring *Paraplasma flavigenum*, the guinea-pig in question representing the nineteenth passage of the infection since the animal was inoculated from the patient I.S. (Lagos Hospital) on the third day of his illness. The author reminds his readers that he had twice before, 1906 and 1912, suffered from attacks of fever which have, by others as well as by himself, been diagnosed as yellow fever.

The inoculation was performed on January 16th, 1914, by injection of ·5 c.c. of the heart blood of the guinea-pig under the skin of the left side of the thorax. The author's temperature before the inoculation varied from 97·2 to 98·2° F., while after it appeared slightly higher, varying from 97·4 to 98·8°. There was a certain degree of bradycardia, and albumin was present in the urine on the morning and afternoon of the 19th and the morning of the 28th of January (Tanret's and Spiegler's mercury bichloride reaction). The author remarks that all the phenomena observed may possibly fall within the limits of physiological variations, but their coincidence is remarkable, and it is quite possible that they constitute the mildest possible reaction to a yellow fever infection.

The blood was examined daily and *Paraplasma flavigenum* was found in specimens 48, 72, and 96 hours after inoculation, whilst all others were negative.

As a result of his experiment the author is led to make the following announcement, which is best produced in his own words :—

> " The mild reaction in this experiment on an immune individual does not guarantee that the result would be similar if non-immune individuals were experimented upon. It appears, however, probable that a germ which had been passed successively through a large number of guinea-pigs might have become less virulent to man, and the idea suggests itself that this might be the way of developing a 'vaccine' prophylaxis against yellow fever. For this reason I believe that experiments of this nature ought to be undertaken, and knowing that an opportunity for performing such experiments is not easily obtained, I consider myself justified in publishing this suggestion, in the hope that other workers may take it up. The practical utility of a personal prophylaxis need not be emphasized."

[The subject of this paper is discussed on page 79.]

C. M. W.

SEIDELIN (Harald). **On the Existence of "Pseudo-Carriers" of the Infection in Yellow Fever.** *Yellow Fever Bureau Bull.* 1914. Sept. 30. Vol. 3. No. 3. pp. 198–202.

The author first mentioned the existence of carriers in yellow fever (1911) because he had found *P. flavigenum* in two individuals who presented no symptoms of yellow fever. In 1912 a few more cases of apparently the same nature were mentioned. Later, in conjunction with HUTTON, the author examined the blood of fourteen of the youngest children in the girls' school at Accra, with negative results. At the dispensaries at Christiansborg and Labadie blood smears from nineteen cases of fever in children were collected, but no Paraplasma infection was found. After the author's departure the investigations were continued by HUTTON, whose results were also negative.

Some results were, however, obtained by examination of individuals under observation as "suspected cases."

> "Some of these individuals were sent to hospital suffering from fever without any definite cause, others were isolated at the inspection of railway passengers leaving Lagos during the quarantine period, others again were found to have rise of temperature, and sometimes albuminuria, when examined as 'contacts' from the areas in which yellow fever had occurred. Only the individuals belonging to the first group were slightly ill, those of the latter two groups were apparently quite healthy and had, as far as it could be ascertained, no idea whatever of their febrile condition."

In the first group *Paraplasma flavigenum* was found in four out of thirty-two cases which were regarded as slightly suspicious. In the second group, mostly children, *Paraplasma flavigenum* was found in one out of six cases, while in the third group, which consisted of twenty-four children with temperatures of 99°–100°, *Paraplasma flavigenum* was found in three. These children did not appear to be ill in any way, their temperatures having been taken at an inspection of "contacts" with yellow fever patients.

It is pointed out that parasite carriers in the strictest sense should be applied to those who carry parasites while presenting no symptoms. In the second and third groups above the symptoms were so mild that unless systematically looked for they would not have been noted, so that for all practical purposes they have the same epidemiological significance as real carriers. It is suggested that they be called pseudo-carriers.

C. M. W.

WENYON (C. M.) & LOW (G. C.). **The Occurrence of Certain Structures in the Erythrocytes of Guinea-Pigs and their Relationship to the So-Called Parasite of Yellow Fever.**—*Jl. Trop. Med. & Hyg.* 1914. Dec. 15. Vol. 17. No. 24. pp. 369–372. With 1 coloured plate.

As a result of the work of SEIDELIN, and at a later date that of MACFIE and JOHNSTON on the so-called *Paraplasma flavigenum*, the authors considered it advisable to examine the blood of healthy guinea-pigs of all ages born and bred in London.

As a result they found that the red cells of such guinea-pigs harbour a small number of minute bodies quite indistinguishable from the supposed parasites of yellow fever first described by SEIDELIN. This is well brought out in an excellent coloured plate, the work of the same artist who drew the figures illustrating MACFIE and JOHNSTON's paper.

The authors deal with the difficulties inseparable from the observation of such tiny structures in red cells, and lay stress on the fact that the bodies occur most commonly in very young guinea-pigs. Indeed, the largest number is found in newly-born animals—a point against their being of a parasitic nature, for placental transmission is exceedingly rare in the whole realm of parasitology, and is unknown in piroplasmosis, trypanosomiasis and other protozoal diseases.

The bodies are carefully described, the blue-grey colour of the substance of which they are chiefly composed being duly noted, and a list of the different forms encountered being given.

The authors then discuss the supposed inoculation of guinea-pigs with the so-called parasite of yellow fever, and record their belief that SEIDELIN and his disciples have fallen into error owing to the non-recognition of these bodies in the erythrocytes of the guinea-pigs before inoculation. They then deal with *Paraplasma flavigenum*, showing SEIDELIN's position to be untenable and his assertions to be unsupported by scientific proof. Their view as to the real nature of the bodies, and of the whole question, is best realised by a study of their conclusions, which are as follows :—

"(1) In the blood of normal guinea-pigs, born and bred in England, are to be found bodies indistinguishable from the so-called *Paraplasma flavigenum* of SEIDELIN.

"(2) In most cases these appear to be definite structures which probably have to do with the development or degeneration of the red cells.

"(3) They are not parasitic because they occur in the blood of newly-born animals, not forgetting even the possibility of a placental transmission.

"(4) The apparent success of the inoculation into guinea-pigs of such bodies from yellow fever cases is due to a failure of a sufficient examination of control animals.

"(5) The evidence in favour of the yellow fever bodies being parasites thus breaks down.

"(6) The presence of such bodies in yellow fever bears, therefore, no diagnostic significance apart from the evidence of blood alteration.

"(7) It is frequently impossible to separate real bodies from pure artefacts, a fact which renders their differentiation one of extreme difficulty."

A. Balfour.

JOHNSTON (J. E. L.). **Yellow Fever.** [Correspondence.]—*Brit. Med. Jl.* 1914. Dec. 19. p. 1089.

This letter is a reply to a review, which appeared on p. 106 of the July 18th issue of the *British Medical Journal*, of an article by Dr. J. W. Scott MACFIE and the writer of the letter on the subject of yellow fever and the inoculation of guinea-pigs and other animals. The writer does not agree with the review for the following reasons :—

1. He considers the question of the parasitic nature of the bodies described as being still *sub judice*.

2. A variation in the character of the bodies is to be expected if one considers the extensive variation in the forms of a well-known parasite like *Plasmodium vivax*. Further, when a completely new form is being described it must occasionally happen that forms are included which subsequent observations would exclude.

3. The degree of variation of the parasites in blood films of piroplasmata of oxen is not less marked than in the bodies described as yellow fever parasites from inoculated guinea-pigs and other sources.

4. The finding of similar bodies in inoculated guinea-pigs in England is not surprising, as these animals may have a similar, though distinct, piroplasma infection.

5. The reviewer does not state clearly enough that the bodies were found in guinea-pigs in West Africa only after their inoculation. The review seems to imply that the animals were naturally infected with the parasite—a complete misrepresentation of the facts.

[It is a pity the writer of the letter does not state the extent of his examination of normal guinea-pigs before inoculation. If such animals in West Africa contained the bodies, the most reasonable assumption would be that they were the same as those in guinea-pigs in England. The matter would be still further complicated by the difficulty of distinguishing the bodies inoculated from yellow fever patients from those occurring naturally in guinea-pigs.]

A reply to this letter is given by Dr. G. C. Low on p. 1120 of the *British Medical Journal* of December 26, 1914. He refers those interested in the subject to a paper in the *Journal of Tropical Medicine and Hygiene*, December 15, 1914, in which will be found answers to the various points raised in this letter (see above). C. M. W.

TORRES (Theofilo). **Prophylaxie de la Fièvre Jaune à Manaos.**—*Bull. Office Intern. d'Hyg. Publique.* 1914. June. Vol. 6. No. 6. pp. 989–995.

This paper is a resumé of a communication made to the National Academy of Medicine of Brazil.* Mention is made of the great success which has attended the anti-yellow fever measures undertaken in Rio de Janeiro with its population of 800,000, at a cost of 15,700,000 francs for the period of three years which it took to eradicate the disease. In Belem, with a population of 150,000, the period was only one year, and the cost 2,826,000 francs. It was calculated that to exterminate the stegomyia and stamp out the yellow fever in Manaos, with a population of 70,000, it would require 942,000 francs, and a correspondingly shorter period of six months. In Manaos the measures were taken up with the utmost energy by Dr. Torres and his enthusiastic supporters, with the result that in the time allotted the disease could be considered as no longer existing, though for upwards of sixty years the town had never been free. Manaos was first attacked in February, 1856, when there were 850 cases with 142 deaths out of a population of 1,300.

An interesting point shown by the statistics of yellow fever in Manaos is the great disproportion between the number of individuals affected and the number of deaths. This is explained by the fact that new arrivals contributed 50 per cent. of the cases and that unless the disease was contracted within six months of arrival the individual could be considered as immune. Old inhabitants were never attacked, and the result was that the disease ran a particularly severe course in these new arrivals, giving a high percentage of deaths.

During the six months immediately before the report was issued there had been no cases of yellow fever though the figures for 1910 showed 293 cases with 206 deaths, and for 1911 540 cases with 278 deaths. The preventive measures in Manaos have thus been as completely successful as in other places where they have been efficiently carried out. C. M. W.

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*A Febre Amarella em Manáos.—*Brazil Medico.* 1914. May 8. Vol. 28, pp. 174–177; May 22. No. 20, pp. 196–198, and June 1. No. 21, pp. 205–207.

LICEAGA (Eduardo). **How War has been waged in Mexico against the Mosquito.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1914. Aug. Vol. 2. No. 2. pp. 118–123.

In 1903 a campaign against the mosquitoes of Mexico was commenced, and has been continued ever since with most gratifying results on the outbreaks of yellow fever.

The author gives a short account of the organisation, which follows the three rules of isolation of yellow fever patients, extermination of mosquitoes and protection of non-immunes from mosquito bites. In addition to the usual methods of carrying out these plans, two seem worthy of mention.

It is stated that a doctor is in charge of each district into which a town is divided. A list is kept of individuals who have not had yellow fever, and are hence non-immunes. These individuals are visited daily and their temperatures recorded. Should this be above 37·5° C., the person is treated by immediate isolation. In a similar manner there is a system of passengers' agents who travel on the railways and inspect the passengers. Should any of these have temperatures of 37·5° C., they are at once protected by mosquito veil or net and taken to the nearest lazaretto for isolation.

[If such measures can be satisfactorily carried out, it is not to be wondered that the incidence of yellow fever in Mexico has shown such remarkable diminution.]

C. M. W.

SLEEPING SICKNESS.

Bruce (David). Classification of the African Trypanosomes Pathogenic to Man and Domestic Animals.—*Trans. Soc. Trop. Med. & Hyg.* 1914. Nov. Vol. 8. No. 1. pp. 1–22.

Sir David Bruce writes, "It seems to me to be as dangerous to classify trypanosomes from old laboratory strains as it would be to attempt to give the natural history of the blue rock pigeon from a study of our tame varieties," and again, "Who can tell what a trypanosome is, after it has passed through the vicissitudes and accidents of ten or twenty years of laboratory life?" All the trypanosomes described in this paper he has studied humself in the field, with the exception of *T. evansi* and *T. equiperdum*. The three points he has depended on in his classification are morphology, action on animals, and mode of development in the tsetse fly. Such methods as cross inoculation experiments and serum diagnosis he does not consider as of much use in making a simple, workable, practicable classification. "If we admit them into our methods the multiplication of species will proceed to an unmanageable degree." He defies anyone to differentiate between *T. brucei* and *T. rhodesiense* or between *T. gambiense* and *T. nigeriense* by any known method. He has been in the habit of describing the trypanosomes he has encountered according to a fixed plan, which is described.

With regard to the biometric method of measurement, he writes that the hope that species of trypanosomes could be separated by curves has not been realised, but they are useful as affording a simple means of expressing graphically the length and distribution of length in a given species. He suggests "that at least 1,000 trypanosomes taken at random from various susceptible animals should be drawn and measured by the same standard method, and that when feasible a thousand trypanosomes from a single white rat taken on ten consecutive days from their first appearance in the blood should also be measured."

Under the heading "Susceptibility of Animals," he notes that *T. brucei*, after passage through white rats for many generations, may kill them in two days, whereas the wild strain kills on an average in twenty to thirty; that *T. simiae*, which in the natural state kills monkeys in ten days, after passage through a goat loses all virulence for monkeys; and that *T. caprae* appears to be incapable in nature of infecting rodents, but can be made quite virulent for rabbits. As regards inoculations, he thinks that a minimum of ten animals of each species should be aimed at.

His classification is as follows:—

A. Group.—*Trypanosoma brucei* Group—
  1. *Trypanosoma brucei* Plimmer and Bradford.
     Synonyms: *T. rhodesiense* Stephens and Fantham;
     T. ugandae Stephens and Blacklock.
  2. *Trypanosoma gambiense* Dutton.
     Synonym: *T. nigeriense* Macfie.
  3. *Trypanosoma evansi* Steel.
     Synonym: *T. soudanense* Laveran.
  4. *Trypanosoma equiperdum* Doflein.

Note.—In the absence of Professor Yorke in Sierra Leone this Section is being undertaken by the Director.

B. GROUP.—*Trypanosoma pecorum* Group—
1. *Trypanosoma pecorum.**
Synonyms: *T. confusum* Kinghorn and Montgomery.
T. nanum Laveran.
2. *Trypanosoma simiae.*
Synonym: *T. ignotum* Kinghorn and Yorke.

C. GROUP.—*Trypanosoma vivax* Group—
1. *Trypanosoma vivax* Ziemann.
Synonym: *T. cazalboui* Laveran.
2. *Trypanosoma caprae* Kleine.
3. *Trypanosoma uniforme.*

With the exception of *T. evansi* and *T. equiperdum*, all these are carried from sick to healthy by means of tsetse flies. Each group is distinguishable or separable by well-defined characters. The chief of these in Group A are the facts that the species are polymorphic and two of them complete their development in the salivary glands of the fly. In Group B the trypanosomes are small and monomorphic and develop in the intestinal tract and proboscis of the fly. In Group C the trypanosomes are monomorphic and develop only in the proboscis of the fly (labial cavity and hypopharynx). "It is fairly easy to separate these groups in the blood of the vertebrate host, or even in the invertebrate host, by microscopic examination alone." Each species is then considered in turn. Of *T. pecaudi* the author writes:

> "In regard to *Trypanosoma pecaudi* there is evidently a good deal of confusion as to what is meant. It is usually described as a dimorphic species similar to *Trypanosoma brucei*. ROUBAUD, however, states that it develops in the intestine and proboscis, but does not reach the salivary glands. If this is so, then *Trypanosoma pecaudi* cannot belong to the *Trypanosoma brucei* group."

Of *T. gambiense* the author says that both in Uganda and Nyasaland there was found great difficulty in starting an infection in the lower animals; it often required repeated injections before a successful result could be obtained.

The following table combines two of the author's:—

	Duration of Disease in days.		No. of Animals Used.		Remarks.
	T. brucei.	*T. gambiense.*	*T. brucei.*	*T. gambiense.*	
Man ..	90 days	2 to 5 years	—	—	
Horse ..	38 „	—	3	—	
Ox ..	134 „	R.	1	—	
Goats ..	42 „	R.	29	18	
Antelope	—	R.	—	—	
Baboon ..	R.	—	1	—	
Monkey ..	26 „	200 days	20	19	8 never showed trypanosomes.
Dog ..	34 „	100 „	25	13	9 „ „ †
Rabbit ..	28 „	—	7	—	—
Guinea-pig	67	264 „	15	13	12 „ „
Rat ..	30 „	135 „	21	25	10 „ „

† *T. gambiense.*

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* "It is probable that *T. dimorphon* Laveran and Mesnil, and *T. congolense* Broden are closely allied to this species; they certainly belong to this group."

Of *T. evansi* he writes :—

"In the laboratory strain described by me in 1911, there were very few short and stumpy individuals found, but there were some, and this justifies the inclusion of this species in the dimorphic group. To put *Trypanosoma evansi* in a group separate from *Trypanosoma brucei* and *Trypanosoma gambiense* would be a most unnatural grouping, as the most cursory examination of these three species discloses the close relationship which exists between them. It is probable if strains of *Trypanosoma evansi* were studied in the field the percentage of short and stumpy forms would be found increased."

In the lively discussion which followed, this classification met with criticism both in its general plan and in detail. Such matters as the meaning to be attached to the name *T. brucei*, the priority of *T. dimorphon*, *T. congolense* or *T. pecorum* came under review. The majority of speakers agreed with the grouping as based on the mode of development in the tsetse fly.

[Sir David Bruce stated in his reply that the description given by KANTHACK, DURHAM and BLANDFORD, into whose hands the trypanosome sent by him from Zululand first fell (1897), showed that it was at that time a dimorphic species. It may be of interest to quote that part of the description which bears on this point :—

"The nagana parasites vary considerably both in size and form; they may be long and pointed or blunt-ended and somewhat stouter; some individuals are short and thick with a short flagellum, their protoplasm being crowded with rounded granules."

With regard to the question, "What is *T. brucei* ?" the following observations are permissible. If the real *T. brucei* is and has always been monomorphic, its study is of little practical value, for it has not been rediscovered in Africa and must be decidedly rare. If it is a dimorphic trypanosome which has become monomorphic, the monomorphic strain is an artificial product, and again attention would be more profitably paid to the strain as it exists in nature.]

A. G. B.

STEPHENS (J. W. W.). **Sleeping Sickness Committee. Minutes of Evidence taken by the Departmental Committee on Sleeping Sickness,** 1914. London: Printed under the Authority of H. M. Stationery Office. [Cd. 7350]. pp. 263–265.*

Broadly speaking, Stephens writes, there are two kinds of tests by which we can distinguish trypanosomes—(1) morphological, (2) biological.

Morphological.—If morphological identity is accepted as constituting specific identity then *T. pecaudi* Laveran, *T. equi* Blacklock and Yorke, *T. ugandae* Stephens and Blacklock, and *T. rhodesiense* are identical. Objections are that sleeping sickness of the *rhodesiense* type does not occur in West Africa or the French Sudan, where *T. pecaudi* is found nor, as far as is known, in Zululand; and, obviously, *T. equi* and *T. rhodesiense* are not the same.

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* It is not the custom in this *Bulletin* to notice publications which appear outside the medical and scientific press. The portion of this communication here summarised is reprinted in the discussion on Sir David BRUCE's paper (*Transactions of the Society of Tropical Medicine and Hygiene*).

Biological.—The following table shows that there is a discrepancy between the morphological and the biological tests in the case of trypanosomes morphologically indistinguishable :—

	Morphologically.	Biologically.	Authority.
T. lewisi and *T. rabinowitschi*	Indistinguishable	Distinct ..	Various.
T. brucei, Zululand, and *T. evansi* (Steel)	Indistinguishable	Distinct ..	Laveran.
T. pecaudi and *T. ugandae*	Indistinguishable	Distinct ..	Mesnil and Leger.
T. rhodesiense and trypanosome of mule, Rovuma, G.E. Africa	Indistinguishable	Distinct ..	Beck.
T. rhodesiense	Indistinguishable	Development in gut and salivary *glands* of tsetse-fly.	
and			
T. pecaudi ..		Development in gut and *proboscis*	Roubaud and Bouet.

A. G. B.

Bouilliez (M.). **Exposé des Travaux en Cours au Laboratoire de Fort-Archambault. (Trypanosomiases ; Mouches Piquantes ; Paludisme ; Bilharziose ; Goître).**—*Bull. Soc. Path. Exot.* 1914. Nov. Vol. 7. No. 8/9. pp. 685–694.

The author says that his two predecessors at Fort Archambault (on the Shari River, 9° N.) had not found any sleeping sickness in the district, and enquiries which he addressed on his arrival to administrators always brought negative results. Later, a patient was brought to him in whose gland juice he found trypanosomes—a woman born in the district, who had never left the part between Lai on the Bahr-Sara and Fort Archambault. In January he travelled along the Bahr-Sara and found cases in several villages near the confluence of that river and the Shari. One near Dai was known by a native name which means " the place where they sleep." From this the author thinks that the disease has been there for a long time. He fears the transport of the virus by boys and native employees coming from the south. He has examined all such persons and found trypanosomes in 5 per cent. of them ; he thinks that the correct figure is probably 10 per cent. To these was given an injection of atoxyl and they were allowed to go, the diagnosis being placed on the sanitary passport. He did not find any *Glossina palpalis*, but remarks that the season was unsuitable.

As regards animal trypanosomiasis at Fort Archambault, there are horses, donkeys and goats, but no cattle. *T. pecaudi* was found in numerous horses ; two cats and a goat were artificially infected. The same trypanosome was found in a large number of donkeys. In a donkey from the Hausa country a trypanosome which suggested

T. cazalboui was found. A goat was infected by him; a cat and a monkey were resistant. Only *G. morsitans* and *G. tachinoides* have been found in this district up to the present.

A few observations are made on malaria, bilharziasis and goitre. Of blood slides collected from children, 79 per cent. were found to contain malarial parasites, chiefly *P. praecox*. Both vesical and intestinal bilharziasis are found and goitre is very general.

A. G. B.

DUKE (H. Lyndhurst). **The Wild Game and Human Trypanosomiasis; with Some Remarks on the Nomenclature or Certain Pan-African Trypanosomes.**—*Jl. Trop. Med. & Hyg.* 1915. Jan. 15. Vol. 18. No. 2. pp. 13–16.

The author refers to a previous paper in which he endeavoured to substantiate his conviction that the sitatunga antelopes on the uninhabited islands of the Victoria Nyanza are acting as a reservoir of *T. gambiense* and are responsible for the continued infectivity of the lake shore *G. palpalis* (this *Bulletin*, Vol. 3, p. 245). Striking confirmation has since been obtained.

> "Two of the fly-boys who have, during the last three years, worked with Dr. Carpenter on the islands have developed sleeping sickness of the Uganda type, and trypanosomes have been demonstrated in their glands. . . . These fly-boys have been constantly exposed to the bites of *G. palpalis* during their work on the islands. For eighteen months and thirty-three months respectively they have resided on the lake shore, chiefly on the islands, and have not been exposed to any other Glossinae. They constitute, therefore, what is practically the equivalent of the crucial test, human inoculation; showing conclusively that *T. gambiense* still exists in these island flies five years after the removal of the inhabitants."

It is noted that in different parts of Africa various observers have described free-flagellated polymorphic trypanosomes, showing posterior nuclear forms, in the blood of game or domestic animals. For East Africa and Uganda Duke cites the trypanosome sent to him by MONTGOMERY (see this *Bulletin*, Vol. 2, p. 242), a similar trypanosome which he recovered from wild game from the *pallidipes* district round Lakes George and Edward (this *Bulletin*, Vol. 3, p. 31), and a trypanosome isolated from the *morsitans* country in the Northern province of Uganda from the blood of a dog. This organism Duke finds to be plentiful in both fly and game. Natives are constantly being bitten; domestic animals cannot exist. A considerable number of Europeans and Indians are also exposed to the bites of these flies, as a motor road runs for some twelve miles through the fly country. "There has, however, never been any suspicion of the existence of a human trypanosome of the *rhodesiense* type originating in this fly-belt, though a considerable proportion of the natives have been recently examined by gland palpation." Organisms of this type appear to be distributed in wild game throughout the tsetse districts of Africa.

Reference is made to the three natural groups of trypanosomes—the polymorphic, the *vivax* group and the *congolense* group. In one or other of these three groups, distinguishable roughly on both morphological and developmental grounds, can be placed the great majority of mammalian trypanosomes of Africa. In an attempt to sub-divide the groups, however, difficulties arise which, Duke considers, are due to the unnatural way in which the finer tests are applied. How is it possible, he writes, to compare the behaviour of a strain kept up by a syringe inoculation for perhaps ten years at a laboratory with one recovered, say, direct from an antelope shot in Central Africa? He continues:—

> "In nature the principal food of the Glossinae consists almost certainly of wild game, domestic ungulates, man and reptiles. Animals such as dogs, and even monkeys, and the group of so-called small laboratory animals, rats, guinea-pigs, rabbits, etc., will be comparatively rarely met with; the hyena and the jackal may, however, be considered as taking the place of the dog among the game. And yet how much of the diagnosis of species done in European laboratories is based on observations of the trypanosomes in this latter group of hosts—both as regards morphological and pathological evidence? If the behaviour of trypanosomes in these 'artificial' hosts were checked by frequent passage through the natural transmitting agent, far less confusion would result and probably very different results be obtained. . . . . .
>
> "Some of Laveran's strains have been kept up by sub-inoculation in Europe for ten years, and yet at the end of that time they are still regarded as stock types of natural species."

Next he refers to *T. nanum* and *T. congolense* (*pecorum*). When first described, that is, when they were still fresh from passage through the insect host, these two species were distinguished by their behaviour on sub-inoculation into dogs. Seeing that the dog is represented in nature by the hyena and the jackal, this may be regarded as a natural test. In addition *T. nanum* is distinguished from *T. congolense* (*pecorum*) as less pathogenic to domestic ruminants. These differences have gradually been eliminated in the course of laboratory upkeep. In Duke's opinion *T. nanum* and *T. congolense* have far more claim to be regarded as separate species than *T. ugandae*, *T. brucei*, *T. pecaudi*, etc., ever had, for in the *morsitans* area of the Northern Province of Uganda trypanosomes occur, some of which answer to the description of *T. congolense*, others to *T. nanum*.

> "By feeding small batches of wild flies on clean dogs and monkeys, and dissecting every fly of each batch, I have recently shown that the greater proportion of the flies with flagellates swarming in proboscis and gut are incapable of infecting these animals—*i.e.*, are infected with *T. nanum*; while the minority infect both dogs and monkeys with *T. congolense* (*pecorum*). In all these experiments the presence of fresh dog's or monkey's blood in the fly's gut at the time of dissection was ample proof of its having fed. Similar results were obtained when the flagellates of the proboscis were injected, and also when the blood of sheep and goats infected with the *congolense-nanum* type of trypanosome was sub-inoculated into dogs or monkeys. Thus in the wild fly of this Uganda *morsitans* country there exist two trypanosomes with the specific characters of *T. nanum* and *T. congolense* (*pecorum*) respectively. The importance of this distinction is obvious when it is realized that carnivora, rodents, and the Anthropoidea are unaffected by *T. nanum* but succumb to *T. congolense*."

In this instance the tendency of laboratory results is to "eliminate a character which natural selection seems to have fixed as a specific difference." Another tendency which he deplores is that of "manufacturing specific differences between strains of trypanosomes which natural tests adjudge to be identical." He considers that had more attention been paid to the comprehensive study of *T. brucei*, *T. ugandae*, *T. pecaudi*, *T. rhodesiense*, etc., such a variety of names would never have arisen. The *T. pecaudi* of ROUBAUD differs from the others in that it appears to have its anterior station in the proboscis of the fly. Confirmation of this work is desirable. All the others of this group which are carried by tsetse have their anterior station in the salivary glands. The diseases caused by all are closely similar, as is the morphology. Why, writes Duke, should they not all be looked upon as one species, as indeed many investigators do regard them?

These polymorphic trypanosomes are under ordinary circumstances non-pathogenic to man, but "expose the exceptional human being to the exceptional strain and infection will result." He would like to see all these trypanosomes described as *T. brucei*, and until it has been demonstrated that the capacity for existing in man survives transmission by Glossina from man to man and not merely from game to an occasional abnormally equipped human being, he does not see that *T. rhodesiense* can claim to be regarded as a good species. *T. brucei* var. *rhodesiense* seems to express better the relationship.

A. G. B.

BOUFFARD (G.). **Note sur la Trypanose Humaine et les Trypanosomiases des Animaux Domestiques et Sauvages dans la Boucle du Niger.**—*Bull. Office Intern. d'Hyg. Publique.* 1914. Oct. Vol. 6. No. 10. pp. 1696-1722.

The Departmental Committee on Sleeping Sickness, which reported last year, submitted through the intermediation of the Foreign Office certain questions to savants of foreign governments. Dr. Bouffard contributed the paper which is reprinted in the above-cited *Bulletin*. The greater part deals with the question of a reservoir of the virus of sleeping sickness and animal trypanosomiases, on the subject of which the Committee sought information. Dr. Bouffard, whose experience is drawn from the territory in the bend of the Niger, distinguishes two kinds of haunts of tsetse, one of small extent, on rivers of moderate size, the other much larger in regions now uninhabited. In the first kind he believes that man is the only reservoir of the virus of the human disease; in the second (the Bani and Black Volta rivers) man cannot be because he abandoned those regions some years ago. If, however, one navigates the rivers in question in the rainy season, there are eight chances in ten that one will become infected; the reservoir must be some wild animal. The author does not, however, think it can be antelope. The rainy season begins in April, and from the end of June pools are so numerous that antelope are not under the necessity of visiting the rivers to drink; they are often prevented from doing so by floods. But it is just at that time that tsetse are most numerous, the percentage infected is highest, and there is most chance of contracting infection. It is thought that the flies must feed chiefly on the hippopotamus and crocodile, which are very numerous, and it is suggested that these animals may harbour the virus. With regard to the small endemic areas, he points out that the cases of sleeping sickness diagnosed are only a minority of those existing, and that the rest form the reservoir and keep up infection in the tsetse. Hence the only effective measure is the destruction of the insect host, which can easily be done in these small areas by deforestation. As regards the large areas he advises investigations to discover if the hippopotamus or crocodile form the reservoir. The hippopotami must be hunted at night and killed away from the water so that their blood can be obtained promptly and not after the usual seven or eight hours immersion. It should then be tested by animal inoculation, the animal of choice being *Cercopithecus patas*.

A. G. B.

MACFIE (J. W. Scott) & GALLAGHER (G. H.). **Sleeping Sickness in the Eket District of Nigeria.**—*Ann. Trop. Med. & Parasit.* 1914. Dec.15. Vol. 8. No. 3. pp. 379–438. With 5 plates and a map.

A paper on this subject by Dr. Scott Macfie, published in the *Annals of Tropical Medicine and Parasitology* was summarised in this *Bulletin*, Vol. 2, p. 344. In the present account there are many points of interest. Sleeping sickness has undoubtedly existed in the Eket district for a great number of years. There are laws and customs relating to it, which, however, have been neglected. The district contains 690 square miles, and the density of the native population is 266 to the square mile. They inhabit a great number of small towns and villages. In sixteen months 222 cases were identified by the discovery of trypanosomes, and 114 others were believed to be trypanosomiasis. Only the undoubted cases are considered in what follows; 84 were studied by the authors personally. Of the 222 cases 140, or 63 per cent., were males and 82, or 37 per cent., females. The number of infected adults of each sex was approximately equal, but boys greatly outnumbered girls, 38·7 per cent. to 17·6 per cent. Over 67 per cent. of cases were in children under 15, a much larger proportion than has been noted elsewhere; 85·1 per cent. are stated to have been under 21. Children are the water carriers and fire-wood collectors, a possible explanation.

TABLE 2.—Analysis of the cases of trypanosomiasis seen in Eket, and a comparison with the figures for the Congo and Gambia (TODD):—

Country.	Age.			Sex.	
	Children.	Adults.	Aged.	Male.	Female.
	%	%	%	%	%
Congo, 1903–0 ..	8·7	89·95	0·35	67·95	32·05
Gambia, 1911	24·0	76·0	0·0	55·7	44·3
Eket district of Nigeria	56·3	43·3	0·4	63·0	37·0

"No case has yet been seen in which trypanosomes could be found by the examination of a drop of the peripheral blood." In practically every case auto-agglutination was observed between slide and coverslip.

All the cases were diagnosed by gland puncture; trypanosomes were always rare and it was often necessary to puncture several glands. An examination of the natives of two villages, one where the disease was prevalent, and the other where it was rare, appeared to show that here as elsewhere prevalence of sleeping sickness cases is associated with a higher proportion of natives with much enlarged glands than elsewhere. The death rate appears to be low. If many children died there would be a scarcity of adults, which is not the case, Eket being one of the most densely populated districts of Nigeria.

The majority of cases showed very slight symptoms. "A visitor to the isolation camp at Ikotobo, seeing the troops of children at play, or dancing on moonlight nights, would be struck by nothing so much as by the apparent good health, high spirits, and happiness of the inmates." In the majority the facial expression was dull, due in part to oedema of the face and especially the eyelids. Some degree of fever was invariably present. Enlargement of the lymphatic glands was not infrequently the only sign of the disease. Skin affections, of several types, were generally present, headache and neuralgic pains commonly. Serious involvement of the nervous system was exceptional; somnolence occurred in less than 10 per cent. Fine tremor of the tongue was common, coarse tremor of limbs and tongue occurred in advanced cases. The treatment consisted of a weekly intramuscular injection of six grains of atoxyl.

Owing to the rarity of the trypanosomes in the peripheral blood and the difficulty in infecting experimental animals it is suggested it must be very exceptional for a tsetse-fly to become infected by feeding on these cases, and an unidentified animal host is postulated as reservoir. [This seems a hardly justifiable assumption, for on the one hand the centrifuge was not used, and on the other the captive antelope in Uganda constantly infected a high percentage of *G. palpalis*, though trypanosomes could not be found in the blood by direct examination.]

Tsetse flies do not occur in large numbers. A specially trained collector seldom succeeded in bringing back more than half-a-dozen as a result of a day's search. In October and December, 1913, practically all the tsetse caught were *G. tachinoides*; this is "unquestionably the most common species." It is often seen attacking pigs. A feature of the distribution of *G tachinoides* in the Eket district is its complete absence from the numerous waterways. These with the exception of the larger rivers and creeks are almost free from tsetse. *G. tachinoides* is found everywhere in the short scrub. This species was found to transmit three species of animal trypanosomes. Game is rarely met with. Sheep, goats, dogs, and dwarf cattle are common.

[As the authors remark a feature of this epidemic is the number of young children attacked. In this connection an extract of a report by Dr. A. D. Milne on sleeping sickness in Kavirondo, British East Africa, is given as showing that the Eket conditions are not unique. "I think the most lamentable feature of the whole tour was the extraordinary number of young children, from two years old upwards, that either showed well-marked symptoms of sleeping sickness or had enlargement of the cervical glands." Here the prevailing occupation was fishing in the tsetse-infested Kuja river, in which the whole population participated, wading in the water. Unfortunately there are no figures.]

Appendix I consists of Notes and Observations on Sleeping Sickness in the Eket District, by Mr. W. C. W. Eakin, of the Qua Iboe Mission, who suspected the existence of the disease in the district as long ago as 1906. He gives the native views on the aetiology, treatment and prophylaxis of sleeping sickness. It is a well recognised disease, is treated by magic and the excision of the glands, and a code of laws exists for its control.

Appendix II is on Trypanosomes found infecting Wild *G. tachinoides*, by Dr. Scott MACFIE. Six experiments were carried out at Ikotobo in November and December, 1913, with the object of determining the species of trypanosomes transmitted in nature by *G. tachinoides*. In four cases the flies were fed on clean guinea-pigs, in one case on a clean rat, and in one on a clean goat. Unfortunately no monkeys were available. Altogether 145 flies were used. The results are shown in the table.

Table 7.—Results of feeding wild *G. tachinoides* on uninfected animals at Ikotobo :—

Experiment No.	Number of flies fed.	Animal.	Result.
1	9	Guinea-pig	Negative
2	37	„	*T. pecaudi* (*T. brucei*, Uganda)
3	25	„	*T. pecaudi* (*T. brucei*, Uganda)
4	16	„	*T. pecorum*
5	22	White Rat	*T. pecorum*
6	36	Goat	*T. vivax*

The author is not aware that *G. tachinoides* has been previously proved to transmit in nature either *T. pecaudi* (*T. ugandae*) or *T. vivax*. [BOUET and ROUBAUD in Dahomey transmitted *T. cazalboui* by *G. tachinoides* in nature (*Sleeping Sickness Bulletin*, Vol. 3, p. 396).]

He notes that the percentage of flies infected is high. In the case of *T. pecaudi* and *T. pecorum* at least two of the 145 flies must have been infected with each; in the case of *T. vivax* at least one out of 36 flies must have been infected. A table is given of the animal reactions of these three trypanosomes. The trypanosomes isolated in the second and third experiments were polymorphic, and abundant posterior nuclear forms were seen in subinoculated rats.

Tables of measurements of the trypanosomes, obtained from guinea-pigs and rats, are given and tables of distribution by percentages in respect of length. Similar information is given on the trypanosomes obtained in experiments 4, 5 and 6.

"Summary.—*T. pecaudi* (*T. ugandae*), *T. pecorum* (*T. congolense*), and *T. vivax* are transmitted by *Glossina tachinoides* in the Eket district of Nigeria, and were isolated by feeding flies caught in the neighbourhood of Ikotobo on healthy animals."

Photographs show a typical village, the characteristic vegetation, native instruments used for excision of glands, and a series of patients. The trypanosomes isolated from animals fed on by wild *G. tachinoides* are shown in a coloured plate. A map of the district is supplied. The whole forms a very complete and interesting report.

A. G. B.

GALLAGHER (G. H.). **The Transmission of *Trypanosoma brucei* of Nigeria by *Glossina tachinoides* with Some Notes on *Trypanosoma nigeriense.*—*Jl. Trop. Med. & Hyg.* 1914. Dec. 15. Vol. 17. No. 24. pp. 372–375.**

The author describes the district of Eket, which is intersected by streams and the vegetation of which appears to consist chiefly of palm trees and short thick scrub. Tsetse flies are not very plentiful; those found are *G. tachinoides* and, less numerously, *G. palpalis* and *G. caliginea.* Here he obtained two strains of trypanosomes which he calls *T. brucei* and *T. nigeriense.* The *T. brucei* strain was obtained by feeding 128 *G. tachinoides* on a clean guinea-pig; it was transferred to another guinea-pig and has since been maintained in this country in white rats. It is of polymorphic type showing long and slender forms with free flagellum and short and stumpy forms with little or none. Some of these have posterior nuclei. The posterior nucleated forms appeared quite early or later in the infection and varied much in numbers in different animals. When 1,000 trypanosomes were counted on approximately the same day and with the same intensity of infection, one rat contained no such forms, another 36·5 per cent. The parasites varied in length from 12μ to 32μ, average 20 to 21μ. Three curves are given. The results of animal inoculations in two guinea-pigs and five rats are tabulated. The average duration of life of the rats was 35 days.

The author discusses the identity of this parasite. Owing to its similarity in morphology and animal reactions to BRUCE's Zululand strain of *T. brucei*; he considers it to be the same. He compares it also with *T. pecaudi*, found by BOUET and ROUBAUD in the adjacent territory of Dahomey and transmitted there also by *G. tachinoides* [these authors state that *G. longipalpis* is the natural transmitter], and thinks it is likely that these are identical, and again that *T. brucei* and *T. pecaudi* are the same. [He does not note that, whereas the *T. brucei* of BRUCE develops in the salivary glands of the invertebrate host, *T. pecaudi*, according to BOUET and ROUBAUD, develops in the intestine and proboscis.] With regard to the contested identity of *T. rhodesiense* and *T. brucei*, and the supposed absence of the former from West Africa, he suggests that a sufficient number of laboratory animals should be kept at each dispensary in West Africa to allow of an inoculation from every human case being made. It might be found that some of the more fatal cases of sleeping sickness attributed to *T. gambiense* in West Africa are really due to *T. rhodesiense.*

The second strain, *T. nigeriense* Scott Macfie, was brought home in a guinea-pig and a monkey. These animals were inoculated with cerebro-spinal fluid obtained from a sleeping sickness patient just before death. Trypanosomes have never been numerous in the animals. An attempt was made to subinoculate three guinea-pigs, a rat and a mouse; all appear to have failed. Examination of the infected animals has revealed the remarkable short stumpy forms described by MACFIE. Competent observers to whom the author has shown them "agree that they are relatively more abundant than in any strain of *T. gambiense* they have worked with."

A. G. B.

MARTIN (Louis) & DARRÉ (Henri). **Documents sur la Trypanosomiase Humaine.**—*Bull. Soc. Path. Exot.* 1914. Dec. Vol. 7. No. 10. pp. 711–716.

In this paper the following subjects are considered:—Intermittent trypanosome fever; the duration of the latent period in the course of certain trypanosome infections; the long duration of the period of nervous symptoms in certain patients; and accidents in atoxyl treatment.

Intermittent trypanosome fever.—The authors have had a case in which intermittent fever, with enlarged spleen, was the only manifestation of the infection (see this *Bulletin*, Vol. 4, p. 255). Trypanosomes were found in the blood and malarial parasites were absent. The patient became infected in French Congo in March, 1913, and was treated in Paris with atoxyl at the end of May. From June to November he had every eight or ten days a violent attack of fever lasting from 12 to 24 hours. Half a gramme of atoxyl every five days had no effect, and an increase of the dosage produced only temporary improvement. In the course of March, April and May he received two series of intravenous injections of tartar emetic; since then there has been no fever and the patient took part in the Lorraine campaign in August. The authors express reserve about the prognosis. Repeated examinations of the blood showed that the febrile attacks corresponded to the appearance in the peripheral circulation of very numerous trypanosomes which were always absent during the apyretic periods. The parasites could be discovered in the blood only at the very beginning of the fever when the temperature was still comparatively low; when it reached its maximum none were to be found. The authors attribute the fever to the massive destruction of parasites under the influence of antibodies in the blood, in fact, to trypanolysis. They found that the blood of the patient obtained at the onset of the fever had a very marked trypanolytic power both *in vitro* and *in vivo* (inoculation into the peritoneum of a guinea-pig, which could never be infected, however rich the blood in trypanosomes). They cite another case in which the fever could be explained similarly.

Duration of the latent phase in certain patients.—As a rule, the authors say, the latent phase, when it occurs, lasts six or eight months. In a case they have recently observed the period was four years. This patient's infection was recognised, by the finding of trypanosomes, in January, 1910. When the patient was examined a few months later there was no sign of the disease, no parasites nor auto-agglutination. For four years his health remained perfect. In April, 1914, he was seized with grave nervous symptoms, trypanosomes were found in the cerebro-spinal fluid and he died in November. It is noted that GUERIN (1869) observed similar cases.

Maximum duration of the period of grave nervous symptoms.—This period, when the case is untreated, lasts six to eight months, and exceptionally a year; even with treatment it is seldom more than a year and a half to two years. The authors had one patient in whom this period was abnormally long. When seen for the first time, in September, 1910, he had had an apoplectic attack and was hypochondriac. The cerebro-spinal fluid contained many lymphocytes and large mononuclears as well as trypanosomes. This patient is still alive, having had in the interval periods of improvement and relapse; the duration of the nervous period has therefore exceeded four years. They are unable to obtain another lumbar puncture.

Ocular symptoms due to atoxyl.—A case is cited in which optic neuritis occurred after the patient had received 3 gm. atoxyl in one month, a dose which is as a rule perfectly well tolerated. A. G. B.

KOPKE (Ayres). **Notes sur la Maladie du Sommeil et sa Médication***—*Bull. Office Intern. d'Hyg. Publique.* 1914. Oct. Vol. 6. No. 10. pp. 1722–1729.

Professor Kopke has treated sleeping sickness patients for the last 13 years. They have come for the most part from Principe, also from Angola and Portuguese Congo. The trypanosome in every case was believed to be *T. gambiense.* The first case mentioned is that of a negro who had trypanosomes in the gland juice. He was treated by atoxyl up to December, 1906. He then remained under observation at Lisbon till November, 1909, when he left for St. Paul de Loanda, where he is employed at the bacteriological laboratory under CORREIA MENDES. He has had no suspicious sign since the cessation of treatment, that is to say for more than seven years. Seven negro patients, all but one infected in Principe, have been under Kopke's care at Lisbon; these have afterwards been sent to S. Thomé, an island free from tsetse flies, where they are under medical observation. He hopes to report later on their fate. A white patient who was infected in November, 1908, in Angola, reached Lisbon in October, 1909, when trypanosomes were found in the blood and gland juice. Atoxyl treatment was begun in November, 1909, and terminated in November, 1910. Seven inoculations of blood into rats made at intervals during 1910 and 1911 were negative. In May, 1911, lumbar punctures showed neither trypanosomes nor change in the leucocyte formula. The patient was seen again in January, 1914, when he was quite well. This patient therefore had remained well for over three years after the termination of treatment and six years after the probable date of infection. Another white patient, who acquired the disease in Portuguese Congo, was treated with atoxyl, and has remained well for two years at the time of writing, Kopke points out that almost all his cases reach him with trypanosomes in the cerebro-spinal fluid, and in these he has not obtained any favourable result.

Later, he used neosalvarsan injected under the arachnoid, and more recently still similar injections of galyl. The results of the former have been published (see this *Bulletin,* Vol. 2, p. 586).

With regard to transmission by other blood-sucking insects and by sexual intercourse, he thinks the part these play is very slight. In the islands of S. Thomé and Principe there are the same climatic conditions and the same insect fauna with the exception that tsetse flies are absent from S. Thomé. In S. Thomé, however, the disease has not established itself, notwithstanding the fact that cases have been imported from Angola, and he himself in 1904 found trypanosomes in the blood of several of the serviçaes in S. Thomé. A. G. B.

***Reprinted from the Minutes of Evidence taken by the Departmental Committee on Sleeping Sickness. 1914. London.**

LEVADITI (C.) & MUTERMILCH (St.). **Ambocepteurs et Arsénobenzol.** —*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 633–640.

Rabbits were infected intravenously with nagana trypanosomes and were examined daily till the appearance of the crisis. The day after the crisis the animals were divided into two lots. One lot, as well as a series of fresh rabbits, received an injection of salvarsan. One-and-a-half to two hours afterwards all the rabbits were bled to death. Three kinds of serum were thus obtained: (1) Serum simply salvarsanised, (2) Serum containing trypanolytic amboceptor, (3) Serum both salvarsanised and containing trypanolytic amboceptor. These three serums were used for the injection of infected mice.

The preventive properties of the serums were estimated by the manner of development of the infection in the animals treated. Of eight experiments five gave constant results, which are shown in tables. It is seen that when the serums containing amboceptor alone, '606' alone, or '606' plus amboceptor are compared, manifest differences are seen in their action on the infection in the mice. As a rule the salvarsanised serum does not influence the multiplication of the parasites and does not much retard the death of the animal. The preventive action of the trypanocidal serum containing only amboceptor is slight; all the mice died with trypanosomes in the blood. On the other hand, the serum, both salvarsanised and trypanocidal, stopped the multiplication of the parasites and mice which received large doses of this serum did not show trypanosomes as long as the experiment lasted (up to 37 days). It follows that the association of salvarsan and trypanolytic amboceptor confers on the serum *in vivo* trypanocidal properties which considerably surpass those of serums merely trypanocidal or merely salvarsanised.

The trypanocidal activity of the three serums was then tested *in vitro*. The results showed that the trypanocidal function of the amboceptor, on the one hand, and of the arsenical derivative on the other, are not added together. Thus:

Trypanolysis by amboceptor + 606 = 1 : 500 serum dilution.
,, ,, ,, alone = 1 : 500 ,, ,,
,, ,, 606 ,, = 1 : 100 ,, ,,

It follows that the amboceptor and '606' do not act in the same manner on the trypanosomes; that they do not attack them in the same way, nor at the same place. To employ EHRLICH's terminology, the arsenic-receptor is different from that on which the trypanolytic body acts. The experiments showed also that between the salvarsanised serum *in vivo* and *in vitro* there is a striking difference. Whilst *in vivo* the action was small, *in vitro* all the trypanosomes were destroyed. The authors explain this by saying that '606' in the salvarsanised serum has no longer the same physico-chemical properties as the initial salvarsan. In the animal body it comes in contact with the parasites only with difficulty. They conclude that in the living organism one of the components of the '606' plus amboceptor complex facilitates the action of the other. The parasites attacked from two sides succumb more easily. They think that the employment of serums at once salvarsanised and trypanolytic is practicable, and they suggest that sleeping sickness patients should be treated by intra-spinal injections of serum containing salvarsan and specific amboceptor. A. G. B.

Ciuca (M.). **Sur l'Action Protectrice et Immunisante du Sérum des Animaux Trypanosomés traités à l'Émétique de Potassium.**—*Bull. Soc. Path. Exot.* 1914. Nov. Vol. 7. No. 8/9. pp. 670–677.

The author's experiments were done with rabbits, guinea-pigs and rats inoculated with the trypanosome of nagana (Uganda). The tartar emetic was dissolved in distilled water or physiological water. The trypanocidal properties of the serum of the infected animals were tested *in vitro* by mixing it in varied proportions with the blood of infected mice diluted with citrated water (2 per cent.). The protective action of the same serum was judged according to the result of the injection of the mixture under the skin of clean mice. The mixture of serum and infected blood was made before the injection. Similar experiments were done in which salvarsan or atoxyl was used. The results are shown in tables. The following conclusions were reached :—

1. The serum of an animal infected with trypanosomes and treated with emetic has protective action only when the infection was a heavy one.

2. The mixture of serum of treated animal and blood of infected mouse has no protective action.

3. The protective action of the emetised serum cannot be attributed to the direct action of the emetic (as in the case of salvarsan). An indispensable condition is that the animal into which the substance is injected should be strongly infected. The serum of a guinea-pig which, under these conditions of infection, has no protective action becomes very active 30 minutes after an intravenous injection of emetic.

A. G. B.

Mesnil (Félix). **Variations Spontanées de la Sensibilité au Sérum Humain Normal d'un** *Trypanosoma gambiense.*—*C. R. Soc. Biol.* 1915. Jan. 8. Vol. 77. No. 33. pp. 564–567.

The author and Ringenbach found in 1912 not only that *T. rhodesiense* was susceptible to normal human serum, but also that a strain of *T. gambiense* kept since 1905 in the laboratory showed a certain degree of susceptibility. This trypanosome had been maintained since the end of 1911 in mice, and at the time of the experiments its virulence for the mouse had become fixed. The age of the serum was important. With serums not more than two days old there were delays of eight days and more in the incubation of the infection, or even complete protection of the mice ; with serums kept three days and more the delay was not more than two to four days and sometimes nothing. Since 1912 the trypanosome has continued to be kept in mice. In May and June, 1914, the author reinvestigated the susceptibility of the trypanosome to normal human serum, and found that it had become augmented. Whereas in 1912 1cc. of serum given mixed with the trypanosomes completely protected the mice only when the serum was fresh, and in a proportion of about one-third, in 1914 none of the mice which received serum from 28 to 48 hours old became infected. The susceptibility, though raised, was still less than that of *T. rhodesiense*, as is shown in a table.

It is noted that there is a marked difference in the serums of infected persons. When these serums possess a specific protective power they completely protect mice, even after two or three weeks on ice. Inversely, given a serum which after six days completely protects a mouse from *gambiense*, one can say that the person who supplied the serum is infected with trypanosomiasis. It might be supposed that the sensitiveness of this *T. gambiense* strain to human serum had steadily increased from 1912 to 1914; a table shows that this is not the case, it having been tested at intervals during that period. All the experiments were made under conditions as similar as possible. It is seen that there was a decrease of sensitiveness of the trypanosomes to the serum between May, 1913, and April, 1914.

Another point came out in the latter experiments. Whilst the action of the human serum showed itself very clearly preventively, it was very feeble when employed curatively, more so even than in 1912. It is suggested that the faculty of multiplication rather than the life of the parasites was affected by the serum. The author submits that sensitiveness to human serum is a general character of pathogenic mammalian trypanosomes, and the fact that human trypanosomes may show themselves thus susceptible indicates probably a return to an ancestral condition when these trypanosomes were not infective for man. Finally, it is noted that the Lanfranchi virus (from a case of laboratory infection) has always shown itself insusceptible to human serum.

A. G. B.

MESNIL (F.) & BOURRET (G.). **Sur un Trypanosome Humain du Sénégal.**—*Bull. Soc. Path. Exot.* 1914. Dec. Vol. 7. No. 10. pp. 716–722.

One of the authors (Bourret) has tested the pathogenicity of the human trypanosome of Senegal on a certain number of animals and, like THIROUX and d'ANFREVILLE, has shown that the virulence is low (see this *Bulletin*, Vol. 2, p. 454). He found that the patas monkey was always susceptible. The virus was brought to France in rats in May, 1912. In order to make cross immunity experiments the authors inoculated a sheep. The inoculation was made in June, 1912. The temperature rose on a few occasions, but examination of the blood was negative. Rats inoculated in July and September did not become infected. The animal was therefore reinoculated in December, 1912. A rat subinoculated in January became infected. Patas monkeys were inoculated in April, June, September and December, 1913. All became infected and showed trypanosomes in from 10 to 15 days. Two rats were subinoculated from patas 1 and two from patas 2; they did not become infected. Patas 1 and 2 died in 20 and 29 days; patas 3 and 4, on the other hand, survived five and seven months, and it is doubtful whether they died of trypanosomiasis. During 1913 and the first half of 1914 the state of the sheep continued to be good. In July it appeared ill and had various symptoms. On the 26th of this month cerebral symptoms were noted. The animal went round in a wide circle, and seemed to have lost consciousness. On the 29th it died. Sections of the brain showed inflammation of the pia mater and perivascular infiltration of the small cerebral vessels, characteristic of sleeping sickness. There were also small haemorrhagic foci in the pia mater and the brain. The authors conclude that the sheep succumbed to a cerebral form of trypanosomiasis. They recall the case of the goat inoculated with *T. gambiense* (Uganda) which LAVERAN has reported (see *Sleeping Sickness Bulletin*, Vol. 4, p. 1). This goat died in 25 months after having shown symptoms attributable to affection of the medulla. The authors draw attention to the different character of the infection in the four patas monkeys and suggest that the pathogenicity of the strain changed. They note the failure to infect rats from the patas, though it was in rats that the strain had been maintained.

They then recount some researches on the protective power of the serum of the sheep at different periods of its infection. The serum was found to delay the incubation of *T. gambiense* in mice and, to a less extent, that of *T. rhodesiense*. In one case there was complete protection against *gambiense*. There was no action on *T. brucei* or *T. evansi*. They conclude that the trypanosome of Senegal behaves in the same way as *T. gambiense*. The action of the serum on *T. rhodesiense* they attribute to the fact that this species is very near to *gambiense*. They think that the species *nigeriense* should be submitted to a similar control, more complete if possible. Until proof of the contrary they agree with BRUCE that it is identical with *gambiense*. Like all strains of *gambiense* recently isolated from man, there were numerous stout forms without free flagellum side by side with the long narrow forms. Posterior nuclei were never seen. Mesnil added that in his various examinations of different human viruses he had never seen a single *T. gambiense* with posterior nucleus.

A. G. B.

LAVERAN (A.). **L'Immunité que confère souvent aux Caprins une Première Atteinte de Trypanosomiase peut-elle être transmise héréditairement?**—*Bull. Soc. Path. Exot.* 1914. Dec. Vol. 7. No. 10. pp. 724–730.

The question whether young rats born of females immune to *Trypanosoma lewisi* are themselves immune has been decided in the negative (LAVERAN and MESNIL; FRANCIS). As concerns pathogenic trypanosomes, information is lacking, but it is obviously important to know whether, in a country where a given kind of trypanosomiasis is prevalent, it would be worth while to make use, for breeding purposes, of females which had acquired immunity to that trypanosome. In the last two years several goats which have been used for Laveran's experiments have given birth to young, and he has taken the opportunity of observing whether the offspring of immune females possess immunity. He details six experiments of the kind and sums up the results as follows:—

1. A goat, recovered from a severe infection of surra and possessing immunity against surra, gives birth to a kid which dies soon afterwards. The blood of the kid collected from the heart immediately after death yields a serum which has no action, in mixture, on the surra virus.

2. A goat which has acquired immunity against surra gives birth to a kid which, 26 days after its birth, is inoculated with surra. The kid becomes infected and succumbs 71 days later with suppurative arthritis which appears to be unrelated to the trypanosomiasis.

3. A goat which has acquired immunity against surra and debab gives birth to two kids. One of these is inoculated a month after birth with the virus of debab; it becomes infected and the infection (not yet terminated) takes its normal course. The other kid, inoculated a month and a half after its birth with the virus of surra, likewise becomes infected. In it also the infection is following a normal course.

4. A goat recovered from an infection of *T. gambiense* gives birth to two kids. The serum of one obtained a month later is inactive in mixture on *T. gambiense*; inoculated with *T. gambiense*, this kid becomes infected on two occasions.

5. A goat which has acquired immunity for *T. congolense* gives birth to a kid which, inoculated with this trypanosome 16 days later, contracts an infection of long duration ended by death.

6. A goat having acquired immunity for *T. congolense* gives birth to three kids. One, inoculated 43 days later with *T. congolense*, becomes infected and the infection runs a normal course.

All these facts, the author writes, testify in the same sense. They show that kids born of goats which have acquired immunity for a given trypanosome have no immunity for that trypanosome. It must be concluded that there is no advantage in choosing, for breeding, in a country where a given trypanosomiasis is enzootic, goats which have acquired immunity for that disease—a conclusion which is probably applicable to bovines also.

A. G. B.

Brumpt (E.). **Le Xénodiagnostic. Application au Diagnostic de Quelques Infections Parasitaires et en particulier à la Trypanosomose de Chagas.**—*Bull. Soc. Path. Exot.* 1914. Dec. Vol. 7. No. 10. pp. 706–710.

The name "xenodiagnostic" is given by Brumpt to diagnosis by examination of the habitual or vicarious vector in which the culture and evolution of the parasite occurs. In short, it is a natural culture of the parasite in a suitable host.

In 1904 the author saw numerous cultures of trypanosomes of fish in the stomachs of previously clean leeches fed on fish in which trypanosomes could not be detected by direct examination. He has now applied this method of diagnosis by leeches to the study of the trypanosomes of Batrachia and serpents in Brazil. The leeches were *Placobdella brasiliensis*, transmitting *T. leptodactyli*, and *Placobdella catenigera*. Fed on frogs apparently uninfected with trypanosomes, heavy cultures were obtained in them.

Working at Butantan, Saô Paulo, Brazil, Brumpt has also shown that *Trypanosoma brazili* from an aquatic serpent, *Helicops modestus*, evolves rapidly to the metacyclic stage in *Placobdella brasiliensis*. *T. brazili* grows rapidly in the leech and in a few weeks gives numerous metacyclic (or infective) forms, but these do not enter the sheath of the proboscis even after several months. It is probable that the serpent infects itself by ingesting parasitised leeches.

When studying the development of a haemogregarine of the aquatic serpent, *Radinia merremii*, the author found flagellates and metacyclic trypanosomes in the stomach of the leeches. Only after five examinations of fresh material was the trypanosome found in the snake.

Certain guinea-pigs infected with *Trypanosoma cruzi* showed no parasites by direct examination, but the parasites were demonstrated by feeding the third stage larvae of *Triatoma* (*Conorhinus*) *megista* upon them. Negative results were obtained by feeding the larvae on three children with an old infection of Chagas' malady, and other diagnostic methods also failed. In recent cases, Brumpt considers that it is certain that infection would be produced. The bug can ingest 10 to 500 times the quantity of blood necessary for a microscopical preparation—a distinct advantage. Also, the leucocytes of guinea-pigs can destroy the rare trypanosomes inoculated with a sample of patient's blood. He considers that the xenodiagnostic method by larvae or nymphs of *Triatoma infestans*, *T. megista*, *T. chagasi*, *T. sordida* and *Rhodnius prolixus* has always given 100 per cent. successes, therein differing from the small proportion of Glossina that become infected with sleeping sickness parasites and various animal trypanosomes.

The author relates the various difficulties of examining patients in Brazil, and so puts forward the xenodiagnostic method. He gives an interesting account of the rearing and biology of *Triatoma megista*.

In a discussion on the paper Prof. Mesnil remarked that similar methods had been employed by BRUCE and colleagues in endeavouring to find natural reservoir hosts of *T. gambiense*.

H. B. F.

BRUMPT (E.) & GOMES (J. F.). **Description d'une Nouvelle Espèce de Triatoma (*T. chagasi*) Hôte Primitif du *Trypanosoma cruzi* Chagas.** —*Ann. Paulistas de Med. e Cirurgia.* 1914. Oct. Vol. 3. No. 4. 5 pp. with 1 text fig. (Also in Portuguese).

In reading the monograph of the genus Triatoma by NEIVA the authors were struck by the biological adaptations of certain members of this genus, which are found both wild and inhabiting the houses of man. Thus *T. geniculata* was found by CHAGAS in the burrows of an armadillo and sometimes in houses, and *T. brasiliensis*, whilst it is common in the straw huts of the north of Brazil, has its normal habitat in the burrow of a rodent. During their stay at Lassance they tried to obtain specimens of these two species and visited a place about 12 kilometers away. This was a rocky uninhabited spot where there were numerous deep burrows of the rodent, *Kerodon rupestris*, called the Moco. Here, after some search, they found a larva under the bark of a dead shrub, in a mass of the moko's dejecta, and a female on a big rock which overhung the entry of a burrow. It was at once seen that this was a different species. The authors give a complete description of it and a figure, and name it *Triatoma chagasi*. It is said to be near to *T. vitticeps* Stal. The bug was found to be very voracious, biting indifferently mammals and birds. In its dejecta were found in abundance metacyclical forms of *Trypanosoma cruzi*, which was determined by infecting marmosets, rats, and dogs [details not given.]

These hemiptera rarely leave their place of birth, so it is probable that the bug became infected in biting a moco. Certainly it could not have been infected from man, the nearest houses being 12 kilometers away. CHAGAS has shown that the Tatu, an armadillo, *Dasypus novemcinctus*, may be spontaneously infected with *T. cruzi*, which seems to be transmitted to it by *Triatoma geniculata*. The authors conclude that the finding in a desert region of an infected *Triatoma chagasi* shows that the virus can exist far from man and permits of the idea that CHAGAS' disease is an infection of virgin regions which man contracts and of which he then becomes the most important reservoir.

A. G. B.

BRUMPT (E.). **Importance du Cannibalisme et de la Coprophagie chez les Réduvidés Hématophages (*Rhodnius*, *Triatoma*) pour la Conservation des Trypanosomes Pathogènes en dehors de l'Hôte Vertébré.** —*Bull. Soc. Path. Exot.* 1914. Dec. Vol. 7. No. 10. pp. 702–705.

In the study of the parasitic diseases transmitted by ecto-parasites, the author writes, any observations of the biology of the latter may have considerable practical interest. Cannibalism, or the sucking of blood contained in the body of other individuals of the species, has been noted in the genus Triatoma in the case of the species *megista*, *infestans*, *Chagasi* and *sordida* and in *Rhodnius prolixus*. It is specially frequent in young larvae and the habit diminishes with age. Triatoma usually suck bugs of the same species when well gorged with blood; the animal fed on is often not inconvenienced and Brumpt has never known one die from this cause. Coprophagy, observed by him in the genus Rhodnius, had previously not been described in blood-sucking biting insects. *R. prolixus* has a pronounced taste for its dejecta, which shows that it may become infected from the dejecta of insects containing flagellates. It is suggested that this progressive adaptation to blood in course of digestion has perhaps been the first stage of the final adaptation to the blood of vertebrates.

The war compelled him to interrupt his experiments with Rhodnius and Triatoma, but he is able to give the result of one carried out with Cimex. In December, 1912, the defibrinated blood of an ox was mixed with defecta of *T. megista*, which contained a large number of metacyclical *T. cruzi* and apparently no crithidial forms. This mixture was put into the fresh skin of a mouse and offered to a number of *Cimex lectularius*, both adults and larvae. Almost all sucked the blood. The bugs were then kept at a temperature of 25° C. and fed on pigeons, as were a large number of controls which had never shown any flagellates in the intestine. Eight days later out of four bugs dissected one showed crithidial forms in the intestine. Two months and six days later, of two examined one showed crithidia in the intestine. Two months and fourteen days later the seven remaining bugs were killed; one showed in the stomach the usual latent forms, and in the intestine both crithidia and metacyclical trypanosomes. Thus in three bugs out of fourteen there was a development of *T. cruzi*. He thinks that crithidial forms passed unnoticed at the time of the examination of the original dejecta and that these developed into trypanosomes. This experiment shows that by the ingestion of developmental forms of *T. cruzi* coming from an insect fresh insects can become infected.

He notes that in certain houses in the country in Brazil all the triatomes are infected with *T. cruzi*, but none of the human or animal inhabitants. Here the flagellates may be transmitted from insect to insect by cannibalism or the dejecta.

He is carrying out fresh experiments. A. G. B.

NEIVA (Arthur). i. **Infecção de Cobayas pela Passagem do *Trypanosoma equinum* através da Conjunctiva sã. (Nota prévia).** [Infection of Guinea-Pigs with *T. equinum* through the Healthy Conjunctiva.] —*Brazil Medico*, 1913. Aug. 22. Vol. 27. No. 32. p. 333.

ii. **Penetração do *Trypanosoma evansi* através da Conjunctiva da Cobaya. (Nota prévia).** [Penetration of *T. evansi* through the Guinea-pig's Conjunctiva.]—*Ibid.* Sept. 8. No. 34. p. 356.

i. A short note stating that the author had succeeded in infecting guinea-pigs after an interval of 14 days with *T. equinum* by the simple instillation into the conjunctival sac of a drop of infected guinea-pig's blood.

ii. A similar note stating that the author has obtained infection in the same way with *T. evansi* at the end of six days, although 10 minutes after the drop of blood had been instilled the conjunctival cavity was freely washed out with salt solution. The author has thus had better success than MITZMAIN, who endeavoured to procure transmission of the same microbe by the bites of *Stomoxys calcitrans*, and was unsuccessful except in one instance (see this *Bulletin*, Vol. 2, p. 130).

The author was successful in procuring the transmission of *T. equiperdum* from guinea-pig to guinea-pig by the same method, the latent period being six days in this case also. J. B. N.

RONDONI (Pietro) & RIETTI (Fernando). **Ricerche Sperimentali sul Nagana. V Comunicazione. Le Alterazioni Istologiche della Milza e delle Ghiandole Linfatiche nella Infezione Sperimentale da *Trypanosoma brucei*.** [Experimental Researches on Nagana].—*Sperimentale.* 1914. Sept. 21. Vol. 68. No. 3/4. pp. 379–403. With 2 coloured plates.

This paper is a continuation of previous researches on the same subject by Rondoni and his co-workers (see this *Bulletin*, Vol. 2, pp. 355 and 363). The authors find that when dogs and other laboratory animals are inoculated with suspensions of *T. brucei* the path of infection is by way of the blood-stream and not by the lymphatic passages. The examination of sections of the spleen and lymphatic glands leads to this conclusion. J. B. N.

LAVERAN (A.) & ROUDSKY (D.). **De l'Inoculabilité du *Trypanosoma lewisi* au Loir** (*Myoxus glis*).—*Bull. Soc. Path. Exot.* 1914. Nov. Vol. 7. No. 8/9. pp. 654–657.

The dormice (*Myoxus glis*), used by the authors in Paris, came from Lugano, Italy. Eleven were available. Two were inoculated intraperitoneally with *Trypanosoma duttoni* and found to be refractory;

the remaining nine were used for experiments with *T. lewisi*. Of the latter, two were successfully inoculated from rats and seven served for passage of the trypanosome from dormouse to dormouse. Details of the experiments with the nine animals are given.

All the dormice inoculated, whether from rat or dormouse, became infected. The duration of the infection was short (4 to 5 days), but the trypanosomes were fairly numerous in the blood and multiplicative forms were seen in every case. Inoculations from dormouse to dormouse always succeeded. *Myoxus glis* recovering from infection of *T. lewisi* became immune. It approaches the jerboa as regards inoculability with this trypanosome. The nearly related *Myoxus nitela*, which is common in France, is less sensitive to *T. lewisi*. [See this *Bulletin*, Vol. I, p. 526, regarding the experiments of BIOT and RICHARD.]

H. B. Fantham.

TODD (John L.). **The Trypanosome of Gambian Mice.**—*Ann. Trop. Med. & Parasit.* 1914. Dec. 15. Vol. 8. No. 3. pp. 469–470. With 1 text fig.

The trypanosome is characterised by "its size and the very long distance between its blepharoplast and posterior extremity." The blepharoplast is rod-shaped. The undulating membrane is "rather scanty." There is a free portion to the flagellum. By careful focussing there are appearances of myonemes. The total length is 43μ and various dimensional details are given.

"It is concluded that the haemoflagellate seen in Gambian mice in 1902 is not a herpetomonad parasite, but a trypanosome, and that this trypanosome is possibly *T. acomys*."

H. B. F.

DARLING (S. T.). **The Endotrypanum of Hoffman's Sloth.**—*Jl. Med. Research.* 1914. Nov. Vol. 31. No. 2. [Whole No. 147]. pp. 195–203. With 1 plate.

The author found the little-known parasite, *Endotrypanum schaudinni* Mesnil and Brimont (see *Sleeping Sickness Bulletin*, Vol. 1, p. 387), in the two-toed sloth, *Choloepus didactylus*, in Panama. No ectoparasites were found on the sloth. Blood was obtained from the heart under anaesthesia. Fresh films showed very few motile parasites, though stained preparations showed more endo-corpuscular forms. There was no progressive movement of the erythrocyte host cell, though the latter had to conform in a general way to the shape and motion of the parasite within. The rounded posterior end of the parasite contained the nucleus, often surrounded by granules. The attenuated anterior or flagellar end "appeared to have a very definite undulating membrane." Most of the infected erythrocytes were distorted by the lashing movements of the flagellum, which forced the host substance outwards as "a glove-like covering to the flagellum." The parasites contained no pigment. Extra-cellular forms appeared in the fresh preparations later. The author found a chromatin filament in fresh and stained specimens of the parasite. "Trophonucleus and kinetonucleus were demonstrable in all specimens."

"Extra-globular forms were only encountered after several minutes' exposure in fresh cover-slip preparations or in films that had been examined first as cover-slip preparations and afterwards made into stained films after removal of the cover-slip. This interesting phenomenon undoubtedly has an important bearing on the life history of the parasite. In many films after drying immediately and staining it was seen that all the forms were endoglobular. Evidently the parasite develops motility and escapes from the erythrocyte, but not until the blood is ingested by some suctorial invertebrate, which may act as the carrier (primitive host)." The parasite is 13·5μ long and 3·5μ broad. Various morphological details are given.

Cultivation and animal inoculation experiments were negative.

Free parasites possess "a trophonucleus and a kinetonucleus, also a chromatin filament, and a short flagellum. An undulating membrane is also demonstrable. The trophonucleus is posterior, while the kinetonucleus is always placed just in front of and to one side of the trophonucleus. This corresponds with Crithidia." The endoglobular forms are considered as ripe or unripe, according to whether they possess a flagellum or not.

No free trypanosomes were found in the sloth.

The author considers that the parasite "develops its locomotive apparatus and in the intestinal tract of an invertebrate escapes from the erythrocyte."

Unfortunately the observations on the parasite were interrupted by the author's absence from Panama.

The plate contains 15 figures. H. B. F.

BERIBERI.

Vedder (E. B.). Some Further Remarks on Beriberi.—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1914. June. Vol. 1. No. 12. pp. 826–847.

The author in a recently published book on Beriberi* maintains that beriberi is a disease resulting in faulty metabolism, *usually* only seen in those persons who eat rice as the staple article of diet, and is directly caused by the deficiency of certain vitamines in the food. The present article is a vindication of this theory, and in it he critically reviews the various articles that have been written lately by Lovelace, Arnold, Fenton, Stanley, and Smith and Hastings in which this view is discredited and the infective theory maintained, or that the beriberi symptoms found to exist in other than rice-eating people are attributable to other diseases. When the accounts of these epidemics are carefully examined it is seen that the deficiency theory has never been satisfactorily disproved, from a want either of accurate knowledge of the food consumed or of recognition that many other foods besides rice, if taken as a staple diet, are able to give rise to this same deficiency of vitamines; for preparations made from white meal, maize, etc., are virtually the same as decorticated rice, and these, with tinned provisions in which the vitamines are destroyed by heat, are definitely beriberi-producing foods. He also draws attention to the fact that on such foods the incubation period in man is about 90 days, which will account for many of the peculiarities of the outbreaks. It is not sufficient to state that the diet has been liberal and varied, but the exact and detailed description of the food *consumed* must be given before we can be certain that a deficiency has not existed†; many of these are *ex parte* statements by those most interested in proving that the dietary supplied has been sufficient. A number of epidemics in jails, etc., in America are described in detail; these were believed not to be due to deficient food, but on careful analysis are shown to have depended upon a deficiency of vitamine containing food, though containing a sufficiency of fats, proteids, carbohydrates, salts and calories up to the standard of the physiological wants previously believed to be necessary. For prevention of beriberi in jails and institutions the following suggestions are offered.

"(1) In any institution where bread is the staple article of diet, it should be made from whole wheat flour.

"(2) When rice is used in any quantity, the brown, undermilled, or so-called hygienic rice should be furnished.

"(3) Beans, peas, or other legume, known to prevent beriberi, should be served at least once a week. Canned beans or peas should not be used.

"(4) Some fresh vegetable or fruit should be issued at least once a week and preferably at least twice a week.

"(5) Barley, a known preventive of beriberi, should be used in all soups.

"(6) If corn meal is the staple of diet it should be yellow meal or water-ground meal, i.e. made from the whole grain.

"(7) White potatoes and fresh meat, known preventives of beriberi should be served at least once a week, and preferably once daily.

"(8) The too exclusive use of canned foods must be carefully avoided."

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* Reviewed in this *Bulletin*, Vol. 3, p. 332.

† This and the preceding remarks are possibly applicable to the cases described by Priest (see this *Bulletin*, Vol. 3, p. 321).

With regard to legislation he points out that in America the use of glucose and talc for coating the rice has no detrimental action, but that this highly milled rice is injurious because of the deficiency of certain substances removed by the milling; that any action to make the use of this rice in the United States illegal would be absurd, but that it is desirable to prevent as far as possible its exportation in quantity to countries where it is used as a staple diet. The very similar relationship of food and pellagra to that of food and beriberi is also discussed.

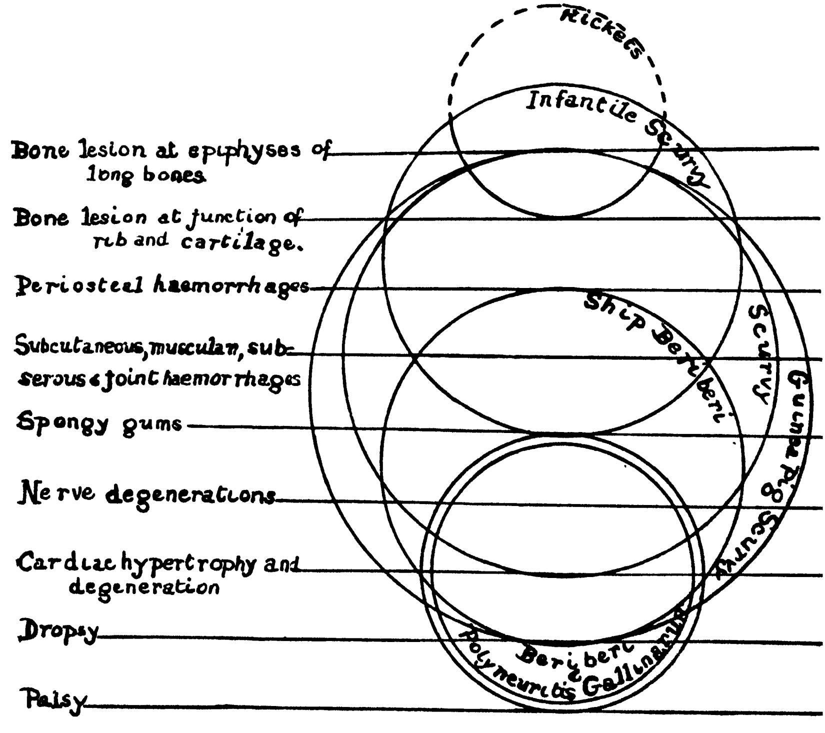
[All interested in the etiology of beriberi should read this valuable paper.]

P. W. Bassett-Smith.

DARLING (S. T.). **The Pathologic Affinities of Beriberi and Scurvy.** —*Jl. Amer. Med. Assoc.* 1914. Oct. 10. Vol. 63. No. 15. pp. 1290–1294. With a chart.

This very interesting and most important paper should be carefully read by all interested in the etiology of the deficiency diseases. FUNK and others have drawn attention to the close relationship of these affections; but while agreeing in the main with FUNK's conclusions, the author states that at present it is not wise definitely to include pellagra. Darling gives a short summary of the group, which includes rickets, infantile scurvy, experimental scurvy of guinea-pigs, ship beriberi, beriberi, and polyneuritis gallinarum, and he shows diagrammatically how the symptoms and pathological conditions overlap.

DIAGRAM.


Rickets
Infantile Scurvy
Bone lesion at epiphyses of long bones
Bone lesion at junction of rib and cartilage.
Periosteal haemorrhages
Subcutaneous, muscular, sub-serous & joint haemorrhages
Spongy gums
Nerve degenerations
Cardiac hypertrophy and degeneration
Dropsy
Palsy
Ship Beriberi
Scurvy
Guinea Pig Scurvy
Beriberi
Polyneuritis Gallinarum

In the following table he displays the chief pathological differences of these diseases so that they can be readily appreciated:—

TABLE I.—SHOWING AFFINITIES AND PATHOLOGIC FEATURES OF SCURVY, BERIBERI, ETC.

Bone lesions at epiphyses of long bones	Rickets	Infantile scurvy	*	Guinea-pig scurvy			
Bone lesion at junction of ribs and cartilage	Rickets	Infantile scurvy	Scurvy	Guinea-pig scurvy			
Subperiosteal hemorrhages		Infantile scurvy	Scurvy	Guinea-pig scurvy			
Joint, subserous, subcutaneous and muscle hemorrhages		Infantile scurvy	Scurvy	Guinea-pig scurvy	Ship beriberi		
Spongy gums		Infantile scurvy	Scurvy	Guinea-pig scurvy	Ship beriberi		
Nerve degeneration			Scurvy	Guinea-pig Scurvy	Ship beriberi	Beri beri	Polyneuritis gallinarum
Cardiac hypertrophy and degeneration			Scurvy	Guinea-pig scurvy	Ship beriberi	Beri-beri	Polyneuritis gallinarum
Dropsy				Guinea-pig scurvy	Ship beriberi	Beri-beri	Polyneuritis gallinarum
Palsy						Beri-beri	Polyneuritis gallinarum

It should be noted that he recognises several varieties of beriberi—namely, infantile and asylum beriberi, wet and dry beriberi (these VEDDER and CLARK look upon as distinct), the Brazilian type described by LOVELACE, endemic dropsy, and endemic peripheral neuritis.

The author, with Surgeon-General GORGAS, spent much time in the study of, and obtained many specimens from, the endemic scurvy found on the Rand in South Africa. The former was struck at once by the similarity of the cardiac condition seen at post mortems with that found in true beriberi, a concentric hypertrophy and dilatation of the right heart, with degeneration of the vagus nerves. At first he was led to believe that this scurvy of South Africa was an infectious disease, but it was later found to depend on the following factors—over-milled corn as a chief article of diet, over-cooked corn, as well as over-boiled food (roasted meat never being supplied), and insufficient vegetables. Clinically, cases were seen of every degree of severity from those who had only spongy gums to those with extensive haemorrhages; in all the knee jerks were exaggerated. Some cases showed marked rickety symptoms with extreme destruction of the chondro-costal junctions, and even collapse of the sternum as in infantile scurvy; others were affiliated to beriberi with cardiac

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* May occur during adolescence, but probably is not encountered in adults.

degeneration and change in the vagus nerves. Personal and racial factors have an unknown influence on the resultant symptoms, for on the same diet distinct syndromes are produced. A deficiency diet in a tropical African negro miner causes severe scurvy, and in a Cape Colony African labourer mild scurvy, and a diet that in some African negroes may cause scurvy will in others produce neuritis. It is possible that in the Rand miners there may be a latent beriberi plus scurvy. This, Darling thinks, may be definitely excluded by the facts that the knee jerks were always exaggerated and not lost as in beriberi, nor was there any anasarca, paralysis, or extreme general atrophy. Scurvy then shades off into ship beriberi in one direction and towards rickets in the other. The Rand scurvy, besides showing the cardiac changes, differs from the ordinary forms found in times of poverty and famine in that it does not so readily yield to treatment. The author sums up in the following words :—

> "The striking excentric hypertrophy and dilatation of the right heart with extensive fatty degeneration of the same musculature, the left heart remaining apparently normal, and the severe degeneration of the vagus nerves described here from several cases of scurvy from the Rand, furnish new and additional facts which show the intimate relationship between scurvy and beriberi as to etiology. The affinities between these two diseases and certain other cachexias lend emphasis to the opinion that they are all the result of the continued use of one-sided and deficient diet."

P. W. B.-S.

LITTLE (J. M.). **Beriberi.**—*Jl. Amer. Med. Assoc.* 1914. Oct. Vol. 63. No. 15. pp. 1287–1290.

It has long been known that cases of beriberi occur in Newfoundland and Labrador, and these have been attributed to the use of a diet often with a great want of variety and deficient in vitamine value, the staple article of food being wheat flour, not rice as in the Far East. The author states that the natives have for many years recognised that in the winter, when the fowls are taken into their cabins, the birds develop polyneuritis gallinarum unless some other food than white bread is given to them. Among the fishing people it is in the vessels that go to the far north, away from the base of fresh supplies, that beriberi most often occurs, and among the shore fishers, who have to depend at certain times of the year almost entirely on white flour for food. The prevalence of the disease is considerable, for out of 5,000 out-patient cases seen at St. Antony's Hospital (Newfoundland) 220 had beriberi, six deaths being recorded, all in acute cases, three of which were of the "wet" type. The general character of the symptoms, diagnostic signs, and methods of treatment are given at some length, but they do not differ from those of other endemic regions, though special stress is placed upon the evidence of involvement of the nerves in early stages of beriberi, differentiating the disease from the closely allied condition of scurvy, common in the same area. A note of warning is also sounded on the probable increase of beriberi as tinned or denaturised foods more and more take the place of fresh meat, especially when associated with a staple diet of white bread.

[DARLING shows in the paper above that nerve degenerations do take place in scurvy, especially in that form found in South Africa.]

P. W. B.-S.

Strong (W. M.). Beriberi in Papua (British New Guinea).—*Jl. Trop. Med. & Hyg.* 1914. Oct. 15. Vol. 17. No. 20. pp. 310–311.

After ten years' experience as Health Officer in New Guinea the author gives some interesting information about the prevalence of beriberi in this region. The disease is most commonly found in natives who are fed on European articles of food, more particularly in the jail at Port Moresby. The prison diet per week is—rice, 10½lb.; biscuits, ½lb.; sugar, ½lb.; tinned meat, 1lb. On this diet cases of scurvy occurred, associated early with "sore mouth." These generally rapidly improved when fresh vegetables or limejuice were given. From 1903 to 1905 there were a number of cases in the jail of an acute or fulminating type of beriberi; in 1906 native foods were supplied, and these cases then became very rare. Sub-acute and chronic forms were also met with, but these, too, were less common after the diet had been improved. In the Purari delta the author found many cases of atrophic nonspastic paralysis, evidently chronic beriberi. In this swampy region, where vegetables were scarce, the natives lived almost entirely on sago, which is probably a food deficient in vitamines. In 1913, when the native vegetable foods at Port Moresby were scarce and the staple article of diet was sago, again beriberi appeared. The author also notes that after bacillary dysentery beriberi is not uncommon, which he thinks is probably due to insufficient absorption of food. He also shows how important it is to note the pulse rate of native labourers who are reported as slack at work, as beriberi overlooked may lead to disastrous results. The evidence of much oedema, or the wet form of beriberi, is apparently rare in this region.

[The association of scurvy and beriberi in a tropical climate where vegetable foods are the staple articles of diet recalls the experience of Gouzien in Tonkin (this *Bulletin*, Vol. 1, pp. 170–171); the etiological relationship of sago to beriberi is important.]

P. W. B.-S.

Mathis (L.). Contribution à l'Étude du Béribéri. Considérations sur la Tuberculose parmi la Population Indigène du Tonkin.—*Ann. d'Hyg. et Méd. Colon.* 1914. Apr.–May–June. Vol. 17. No. 2. pp. 483–500.

The author from his experience with the French troops in Tonkin states that beriberi cannot be considered as endemic at Caobang, but it undoubtedly exists and at times causes much trouble. It is said to have been introduced into the prison there in 1905 by a number of Annamites, who had been transferred from Hanoi, where the disease was prevalent. Most of these cases died, but the disease spread to the annex prison of Cau-Dong, a few cases appearing yearly. Again in 1910, after another large transfer of prisoners, there was a fresh epi-epidemic. The type seen was mostly of the wet form and the mortality was high, 34 per cent. The author is convinced that the disease is a toxic infection probably due to a protozoal organism (this opinion he founds on the absence of a polymorphonuclear leucocytosis and a diminution of the eosinophiles), but that the ingestion of rice plays an important part in the causation, for the cases are practically limited to those who are chiefly rice eaters, rarely occurring in Quang-Tcheou-Wan, where the people are miserably poor, but eat scarcely any rice. He found that the use of decorticated stale rice was associated with recurrences of epidemics and that the people who lived in villages suffered the least, their food being less often stale and better cooked (sterilised). The author is a strong supporter of the infectious theory of beriberi, and believes that stale rice acts probably as a medium by which the infective agent is introduced into the body where it undergoes some development, frequently giving rise to intestinal symptoms. He advocates a more careful search in the rice for micro-organisms, and states that prophylactic measures are simple. (1) Remove infected persons from towns to the country villages, where the disease does not apparently spread; (2) Use recently decorticated rice, if possible prepared daily and have it thoroughly cooked to ensure complete sterilisation; (3) Prohibit all other stale or possibly infected food (such as fish) and substitute fresh beef, eggs, vegetables, and fruit. Active medical treatment he strongly condemns, such as atoxyl, salvarsan or lumbar puncture.

P. W. B.-S.

SMITH (F.). **Beriberi or Polyneuritis among British Troops in India.**—*Jl. R. Army Med. Corps.* 1914. July. Vol. 23. No. 1. pp. 64–66.

In a previous paper [see this *Bulletin*, Vol. 1, p. 486], the author and Captain HASTINGS described the occurrence of multiple neuritis among the soldiers at Lebong, in the Darjeeling Hills; they then believed it to be a place disease and infective. Further observation has strengthened this belief, for a healthy regiment which was quartered at Lebong in place of the affected one became infected with the disease, regiments at other military health resorts near to remaining free. An account of a discussion on this subject at the All India Sanitary Conference is given in which the etiology of beriberi was considered, but no conclusion was arrived at.

P. W. B.-S.

CARDAMATIS (J. P.). ΚΑΡΔΑΜΑΤΗ (ΙΩΑΝΝΟΤ Π.). Ἡ πολλαπλῆ περιφερικὴ νευρῖτις ἡ Νόσος Beriberi ἐν Ἑλλάδι [Multiple Peripheral Neuritis or Beriberi in Greece.]—„Ἰατρικὴ Πρόοδος." 1914. Aug. 1 and 15. Vol. 10. Nos. 15 & 16. pp. 58–59.

In connection with a reported case of beriberi in Greece the author takes the opportunity of saying that a few years back, when the territory of Greece was less than it is at present, he instituted an enquiry as to the existence of the disease in the country and could find no evidence of its presence.

J. B. Nias.

YAMAGIWA (K.). **Experimental Study on the Cause and Origin of the Beriberi. 3rd Report.**—*Sei-i-Kwai Med. Jl.* 1914. Sept. Vol. 33. No. 9. (Whole No. 391. pp. 55–56. [The Original in No. 10, Vol. 28 of the *Jl. Tokyo Med. Assoc.*]

A short epitome is given of a comparative study of the pathological changes found in the experimentally produced riberi of fowls and those which occur in human beriberi. It is stated that pericarditis, fatty changes in the cardiac muscles, a small cell perivascular infiltration of the liver, numerous eosinophilic cells in the liver and spleen, with a severe catarrh of the stomach and intestine, are more often found in fowls, while segmentation of the heart muscle fibres, and degenerative changes in the epithelium of the convoluted tubes of the kidney are most common in human beriberi. In conclusion the author considers that the disease in fowls which are fed upon decorticated rice is an intestinal auto-intoxication and not due to a condition of partial inanition. P. W. B.-S.

IDO (Y.) & WATANABE (Y.). **The Orthodiagraphic Examination of the Heart by the Beriberi**—*Sei-i-Kwai Med. Jl.* 1914. June 10. Vol. 33. No. 6. (Whole No. 388) pp. 35–36. [The Original in No. 22. Vol. 27 of the *Jl. Tokyo Med. Assoc.*].

By orthodiagraphic examination of the heart in various stages of beriberi the authors detected certain changes which seemed to be characteristic. These were a widening to the right and a bulging of the lower border, with an alteration in the position of the pulmonary artery and left auricle, which appeared to be pushed towards the left. These changes disappeared during convalescence. P. W. B.-S.

WERNER (H.). **Morbus Basedowii bei Beriberi.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. Apr. Vol. 18. No. 8. pp. 283–284.

The author describes a case of dropsical beriberi occurring in a Chinese stoker, which was associated with symptoms of exophthalmic goitre (Graves's or Basedow's disease). A week before admission to hospital the patient had suffered from palpitation, shortness of breath, and swelling of the legs; the latter disappeared after a few days, but was followed by loss of muscular power, swelling in front of the neck and protrusion of the eyeballs. On admission to hospital there was marked atrophy of the peroneal muscles and those of the forearm, with loss of knee jerks, but no sensory changes. The right half of the thyroid was much enlarged with marked exophthalmos and there was a convergent strabismus, the two latter symptoms following the onset of the beriberi symptoms. The pulse was rapid and the heart's action irregular; there was also a slight pyrexia. On a mixed diet with rice bran he improved markedly and after six weeks was discharged to duty. The author states that "taking into consideration the frequent implication of the sympathetic system in beriberi and the important etiological rôle which this system plays in Basedow's disease, he considers that the beriberic origin of this case is not improbable, and it will be interesting to note if similar conditions are found by others." P. W. B.-S.

HANDA. **Concerning the Treatment of Beriberi.** (Translated from the Japanese by Major George H. R. Gosman).—*Military Surgeon.* 1914. Sept. Vol. 35. No. 3. pp. 263–272.

After thirty years' clinical experience of beriberi in the Japanese army, including the periods of the Japanese-Chinese and Japanese-Russian wars, the author finds it best to divide the disease into two stages, *Progressive* or oedematous, and *Retrogressive*, or what H. WRIGHT calls "beriberic residual paralysis." Handa includes the acute cardiac attacks in the progressive stage. He states that patients, particularly when on active service, should never be moved until the second stage has set in, and to hasten this he pins his faith to purgatives, chiefly sulphate of magnesia. The worse the case the larger the dose must be, up to 150 grams in twenty-four hours. When vomiting is present calomel is useful to set up the initial purging, after which the magnesium sulphate should be given.

He states that this treatment, associated with rest and proper dieting (exclusion of any kind of rice and substitution of barley foods with milk, meat, and vegetables), is most successful. Too often the dose of the sulphate is inappropriate; to a grave case, which should have in twenty-four hours 60 grams or over, 30 grams is given, suitable only for a mild one, and the result is unsatisfactory. When cardiac symptoms are present this treatment is more urgently demanded and with it the decrease in the area of heart dullness is often very marked. With these massive doses he has never seen any bad results. The rest, which is so absolutely necessary for the first type of cases, is not required in the retrogressive condition unless cardiac palpitation is marked, but rice must still be omitted, a more mixed and varied diet being given.

P. W. B.-S.

HONDA (K.). **Ueber die pathologisch-histologischen Befunde des nervous Systems bei Beriberi.** [The Pathological Histological Changes of the Nervous System in Beriberi.]—*Mitt. a. d. med. Fakultät d. Kaiserl. Univ. zu Tokio.* 1914. Apr. 25. Vol. 11. No. 3. pp. 319–416. With 2 tables and 5 plates.

The author in reviewing the literature shows how diverse are the views held not only as to the amount of implication of the cord and the peripheral nerves, but also as to the character of the changes in the nerves themselves. After an examination of numerous sections from 26 cases (3 acute, 2 infantile, and 21 chronic), he was able to classify the nerve changes in three groups:—(*a*) *Changes without interruption of continuity:* Analogous to cloudy swelling, affecting both the axis cylinder and medulla. It is present in almost all nerves and obviously is an early stage. It may terminate in complete restoration, advancing degeneration, or in course of time in atrophy. This is not peculiar to beriberi. (*b*) *Changes with interruption of continuity:* The nerve changes are not diffused, but are localised in patches; all degrees of degeneration may be seen near together. The medullary sheath is divided up into fragments, the continuity of the axis cylinder is not broken, but it may be charged with coarse and fine granules. These changes denote more or less functional loss. (*c*) *Atrophic changes:* The nerve bundles are greatly shrunken, the medullary sheath is nearly normal, but the axis cylinders are narrow and uneven; the interstitial tissue is generally increased. In these cases function will be greatly disturbed, but not quite lost.

He notes that there is no sharp line between these three stages, and that the "intensity" of the lesion in the periphical nerves is greater in chronic cases, whereas the "extension" is more marked in acute ones. The condition (*a*) is found in almost all nerves and in all acute cases; (*b*) and (*c*) are found generally in the nerves of the extremities, never in the vagus, rarely in the phrenic, and are present after the disease has lasted some time. The author would define acute beriberi as that form of the disease in which the vital nerves (phrenic and vagus) are affected at the same time as the nerves of the extremities, chronic beriberi when the nerves of the extremities are first affected, while the vital ones show little or no change. The condition found in infantile beriberi was closely related to that found in the acute adult form.

In the cord vacuolation of the ganglionic cells was found, but no special nerve tracts were affected. Circumscribed, greatly altered foci in the spinal roots were very commonly seen; these were probably artificial. The changes in the nerves are therefore: first, cloudy swelling; second, degeneration; third, atrophy. The author is inclined to believe that these conditions are due to a beriberi poison which has a selective action. Details and summaries of special cases are given, with five very excellent coloured plates.

P. W. B.-S.

McCRAE (J.). **The Phosphoric Oxide Content of Maize Flour.**—*Jl. of Hygiene.* 1914. Nov. Vol. 14. No. 3. pp. 395–398.

FRASER and STANTON have shown that highly polished rice gives rise to polyneuritis, but that whole rice does not, and that the disease can be cured by adding rice polishings to the diet. Whole rice contains 0·469 per cent. of P_2O_5, polished rice only about 0·277 per cent., and the polishings 4·2 per cent; they do not claim that the P_2O_5 is curative, but that it is an indicator, the vitamine being the active principle, and it is known that the vitamines in different grains and natural products are not identical. In the case of maize flour the loss of phosphoric oxide is similar to that of rice flour, but not quite so marked, and it is probable that a diet of maize meal is not so harmful as that of rice in which the phosphoric oxide is reduced to ·27 per cent. As maize meal is the staple article of diet for the native labourers in the Transvaal it is desirable to find a method of milling which shall minimise this loss of P_2O_5 (and vitamine).

When the maize was so treated that 96 per cent. of the original grain was converted into fine meal, it was found to contain nearly as much P_2O_5 as the whole grain.

PERCENTAGE OF P_2O_5.

	A	B	C	D	E
Whole Maize ..	·53	·49	·48	·57	·45
Fine Meal	·51	·46	·46	·53	·45

Experiments on 6,000 native labourers are being conducted with the old meal and the new, the men being divided into two equal groups, and so far the incidence of disease among those using the new meal is much less than those having the old. Full reports will be furnished later by Dr. MACAULEY, but it seems that the over-milled maize is a food defective in some properties, which induces a form of deficiency disease, and that when the whole grain is used as flour the defect is remedied.

P. W. B.-S.

Braddon (W. L.) & Cooper (E. A.) **The Influence of Metabolic Factors in Beri-Beri. Part 1. The Effect of increasing the Carbohydrate Ration on the Development of Polyneuritis in Birds fed on Polished Rice.**—*Jl. of Hygiene.* 1914. Nov. Vol. 14. No. 3. pp. 331–353.

A large number of observers have shown that polyneuritis in fowls develops proportionately to the quantity of polished rice ingested; that is, that though there had been a larger total of vitamine taken it was not able to protect the birds when the food ration had a low content of anti-neuritic substance. The same has been observed with human beriberi, for in epidemics the well nourished are more liable to the disease than the under fed, and men, who take more polished rice, are more liable than women who usually eat less. In prisons and asylums every increase in the polished rice component of the diet, other food stuffs remaining the same, was attended with an increase of beriberi. From these observations Braddon concluded that in rice-eating people the severity of beriberi varies directly with the quantity, absolute or relative, of the polished rice consumed. If we admit then that beriberi is due to the deprivation of a certain essential factor, it is important to determine the precise rôle which the active substance plays in metabolism, and to fix if possible the quantitative relation it must bear to the other components of the dietary. With this object a very large number of experiments was carried out, partly by Braddon in the Malay Federated States, and partly by Cooper at the Lister Institute, London. These are described in detail in the paper. The main conclusion arrived at is that the amount of anti-neuritic substance required by the organism increases with the quantity of carbohydrate *metabolized*, and for the prevention of beriberi the proportion of the anti-neuritis food-stuff in the diet must be as high as possible, and large rations of food stuffs deficient in the active substance carefully avoided.

The summary and conclusions arrived at by the authors are of sufficient importance to be here given in extenso :—

"(1) Chickens fed on $\frac{1}{20}$ their body-weight daily of padi, cured or parboiled unpolished rice, or fresh (partly polished) rice, remain free from polyneuritis for at least 28 to 100 days.

"(2) Chickens fed on the same ration of polished Siam rice develop symptoms of polyneuritis in from 20 to 70 days.

"(3) When the polished rice is soaked in excess of water for 24 hours the birds succumb to polyneuritis in from 10 to 35 days; when the rice is soaked for 48 hours the disease appears still more readily, viz. in 15 days.

"(4) Chickens fed on $\frac{1}{20}$ their body-weight of parboiled rice which had been soaked for 24 hours also develop polyneuritis in from 13 to 39 days. This fact is of practical importance, as epidemics of beriberi have been traced to the practice of soaking unpolished rice prior to cooking and discarding the water.

"(5) Although birds fed on diets of polished rice, sago, or glucose develop polyneuritis, when fed on commercial starch they often fail to do so and merely lose considerably in weight. An explanation is offered.

"(6) While fowls fed on $\frac{1}{20}$ their body-weight of padi remain free from polyneuritis for at least 60 to 100 days, when this ration is supplemented by $\frac{1}{8}$ the body-weight of washed unpolished rice, or $\frac{1}{10}$ of polished rice, polyneuritis appears in from 20 to 30 days.

"(7) On the other hand, chickens fed on rations varying from $\frac{1}{8}$ to $\frac{1}{30}$ of their body-weight of washed unpolished rice develop polyneuritis in about the same time, 10 to 20 days.

"(8) On dietaries composed of rations of polished rice varying from $\frac{1}{20}$ to $\frac{1}{40}$ the body-weight and of yeast varying from $\frac{1}{1500}$ to $\frac{1}{3500}$ the body-weight pigeons and chickens do not develop polyneuritis until at least 32 to 100 days have elapsed, but when the carbohydrate ration is doubled by the addition of polished rice or sago the birds fall ill in from 13 to 46 days.

"(9) Even when daily rations of polished rice as large as $\frac{1}{10}$ the body-weight are fed to chickens together with varying amounts of yeast, 93 to 98 per cent. of the carbohydrate is digested and absorbed and the excreta contain no anti-neuritic substance. This shows that the rapid development of polyneuritis induced by feeding large rations of starch is not due to interference of undigested carbohydrate with the absorption of the active material.

"(10) Intestinal bacteria, unlike yeast, contain little anti-neuritic substance.

Conclusion and Practical Application of the Results.

"The amount of anti-neuritic substance required by the organism increases with the quantity of carbohydrate metabolized. For the maintenance of health the intake of active substance must therefore be adjusted, so as to stand in some quantitative relation to the ration of carbohydrate ingested, and it is when this necessary balance is not maintained in the dietary that beriberi results. Although as ordinarily induced beriberi can be described not inaccurately as a 'deficiency disease,' it may thus actually develop when a dietary containing an adequate amount of the anti-neuritic substance is regularly supplemented by a ration of a carbohydrate foodstuff deficient in this essential substance.

"This is obviously of great practical importance in the prevention of beriberi. Attention must be paid not only to the absolute amount of anti-neuritic foodstuff incorporated in the dietary, but to the proportion which this bears to the total carbohydrate ration. The precise relation which must subsist between the supply of active material and the amount of carbohydrate metabolized has not yet been ascertained, nor has it been determined for the other normal components of a dietary, *e.g.* protein and fat. It is therefore advisable to maintain the proportion of anti-neuritic foodstuff in the diet as high as possible, and large rations of foodstuffs deficient in the essential substance should be carefully avoided.

"In the preparation of a dietary to obviate beriberi, it thus becomes necessary to consider not merely its absolute content of anti-neuritic material, but also its total calorific value."

P. W. B.-S.

McGarrison (Robert). **A Contribution to the Study of Experimental Beriberi. (Preliminary Note).**—*Indian Jl. Med. Research.* 1914. July. Vol. 2. No. 1. pp. 369–374. With 4 plates.

In an experiment bearing on the etiology of beriberi 36 pigeons were used; 12 were fed on dry polished Rangoon rice, 12 on the same rice boiled, and 12 on a good mixed diet for one month. In group (1) seven birds developed polyneuritis, in group (2) nine suffered; all the controls remained healthy. It is noted that each bird used was infected with Halteridium. Cultures made from the liver, kidney, spleen and heart of five of the affected birds killed late in the disease showed a profuse growth of an organism of the *Bacillus suipestifer* group. The same organism was obtained much less abundantly from eight of the pigeons which had been fed on polished rice, but had not given any signs of polyneuritis, though they were in an early stage

of the disease as shown by the presence of degeneration of the sciatic nerves. Four of the control pigeons were also examined; in three the organs were sterile, in one the organism developed in small numbers from the spleen, liver, and kidney. Inoculations of this culture growth were made into 6 rabbits, 8 fowls, and 14 pigeons, all of which were kept on good diet. In 19 or 67 per cent. symptoms clinically like those of polyneuritis set in within nine days. The sciatic nerve in all showed degenerative changes, and the inoculated organism was recovered. In the 17 controls the tissues were sterile and the sciatics were healthy. In a foot note, it is stated that the same bacillus has been obtained from the internal organs of a second series of 25 pigeons suffering from experimental polyneuritis. There are four excellent plates showing the affected animals and birds and examples of degenerated nerve fibres.

[These interesting and highly suggestive experiments will no doubt be followed up by workers in other localities, and, as the author remarks, "they will form the subject of further enquiry" before we add this bacillus to the long list of causes of beriberi. Paresis of the limbs is a very common sign attending septicaemic conditions in animals.]

P. W. B.-S.

Gibson (R. B.) & Concepcion (Isabelo). **Nerve Degeneration in Fowls fed on Unhusked Rice (Palay).**—*Philippine Jl. of Sci.* Sect. B. Trop. Med. 1914. Feb. Vol. 9. No. 1. pp. 119–122. With 1 plate.

Many observations of different experimenters are quoted to show that beriberi symptoms will occasionally arise both in birds and man when unpolished rice has been used for food, leading to the conclusion that the rough rice does not contain in the cortex the protective substances in sufficient amount to prevent the development of beriberi in the more susceptible individuals, or in other words, "*the unpolished rice, per se, affords only partial protection against beriberi.*" To demonstrate experimentally that this is the case, they fed six fowls for periods of from two to four months in this way and then examined the sciatic nerves. These showed degenerative conditions which corresponded with those found in two weeks in fowls fed on polished rice. From this they deduce that the addition of other foodstuffs to a diet of unpolished rice is essential to meet the normal nutritive requirements of the body.

P. W. B.-S.

Stepp (Wilhelm). **Ueber Lipoidfreie Ernährung und ihre Beziehungen zu Beriberi und Skorbut.** [Lipoid-free Food and its Relation to Beriberi and Scurvy.]—*Deut. Med. Woch.* 1914. Apr. 30. Vol. 40. No. 18. pp. 892–895.

The author commences by describing the experiments of Wilcox and Hopkins, who found that the amino-acids were necessary in diet, and that foods such as maize in which they are absent are defective. His previous researches on the lipoids in relation to beriberi and scurvy are referred to, and he defines lipoids as

non-saponifiable substances regularly found in animal and vegetable cells, having the same properties of solubility as fats. His investigations were carried out to determine whether these lipoids, constantly taken with ordinary food, can be built up in the body if not supplied in the food. Out of over 100 animals fed on lipoid-free food not one lived; in spite of the fact that their appetites were not affected, the animals lost weight quickly and in 3–4 weeks died showing progressive loss of weight and weakness. If any lipoid-rich substance as yolk of egg or calves' brain was added, the animals recovered, and he showed by experiment that these protective substances were destroyed by long boiling. If the ordinary food of mice was heated and extracted with alcohol and then given to them the animals all died; that is, this procedure had the same effect as feeding the mice on lipoid-free food. Heating the food in water produced the same result, but it was not so marked. It is possible that this is due to some alteration of grouping of the atoms which the body could not build up again, or possibly the heating may produce some poisonous substance; the latter view the author does not think correct. His experiments with lipoid-free foods proved that the result is not due to a want of, or change in, the inorganic salts—neither was it due to want of fat, for the addition of lipoid-free fats from milk or butter did not protect the animals, but alcoholic extracts of dried skim milk were effective. The addition of cholesterin, lecithin, phytin, etc., to the prepared food was also useless; therefore some other unknown substance was required, viz., vitamines.

He attempted to isolate the protective substance from egg by fractional distillation. Animals receiving an acetone extract all died. If this acetone-extracted yolk of egg was not extracted with alcohol, and this was added to the food the animals lived longer, but if egg was directly extracted with alcohol, the extract was curative. Normal food for mice was extracted with ether in a Soxhlet's apparatus for 9 days; 10 mice were fed on this and all remained well for 45 days; afterwards the same mice were fed on the same food, which had been treated with 96 per cent. alcohol, and all died in 23 days. Therefore, ether does not separate any substance important to life, whereas alcohol does.

In the latter part of the paper the clinical characters of beriberi are given and the various theories of EIJKMAN, SCHAUMANN, FUNK, NOCHT and others are described. The author concludes that in varied diets substances are present necessary for life, that these can be extracted by alcohol but not by ether, that pure fat and other lipoid combinations as yet tried, when added to an extracted diet do not render the food efficient because they are not able to supply the essential vitamines. Probably vitamines plus certain lipoids are necessary.

P. W. B.-S.

COOPER (E. A.) The Curative Action of Autolysed Yeast against Avian Polyneuritis.—*Biochemical Jl.* 1914. June. Vol. 8. No. 3. pp. 250–252.

Methods are described for obtaining an active preparation from yeast able to cure pigeons and chickens suffering from experimentally produced polyneuritis, and it was shown that large amounts, even ten times the curative dose, had no injurious effects. Both the solution and air-dried yeast retained their curative properties for long periods. He concludes "that autolysed brewer's yeast should afford a simple inexpensive method of preparing a non-toxic solution suitable for the oral treatment of beriberi."

[It does not by any means follow that because these yeast preparations are able to cure polyneuritis in birds they will do the same for the more chronic disease as seen in man; in fact, yeast treatment has usually given disappointing results when tried in the wards.]

P. W. B.-S.

RAMOINO (Paolo). **Contributo allo Studio delle Alimentazioni Incomplete. Nota 1.—Stato Attuale della Questione.**—*Pathologica.* 1914. Nov. 1. Vol. 6. No. 144. pp. 541–550.

In this somewhat lengthy contribution the author reviews a great deal of the literature that has appeared during the last twenty years bearing on food deficiency as a cause of disease; the work of those who have studied beriberi, scurvy and pellagra being freely referred to. The paper contains no new facts, but is interesting reading.

P. W. B.-S.

UNDULANT FEVER.

Cantani (Arnaldo). Sintomi e Complicazioni non Comuni della Febbre di Malta. [Uncommon Symptoms and Complications of Undulant Fever.]—*Riforma Medica.* 1914. May 30. Vol. 30. No. 22. pp. 595–601.

The author describes some of the symptoms and complications which have within the last few years been described as associated with undulant fever and are not dealt with sufficiently, or even mentioned, in the text books on tropical medicine. These are, splenomegaly, enlargement of the liver, jaundice, enlargement of the mesenteric glands, suppuration, phlebitis, arthritis, endocarditis, bronchitis, cutaneous affections, meningitis, chorea and psychoses. [It is not possible or necessary to describe these various phases here, and many of the papers quoted have been reviewed during the past two years in this *Bulletin.*] Very large spleens simulating those found in splenic anaemia and mistaken for that condition were found in 6·6 per cent. of the author's cases, but not until the fever had lasted six months or more; usually the spleen is scarcely palpable. Enlargement of the liver with jaundice and ascites has been noted by several observers and is generally seen late in the disease; a case is fully described. The enlargement of the mesenteric glands, which always contain the specific micro-organism, is a constant feature in animals infected by feeding experiments. That the *M. melitensis* can cause areas of tissue necrosis, endocarditis and arthritis is well known, but cases of phlebitis (in women), meningitis and chorea have only lately been recorded, mostly in young children from southern Italy and Sicily. In the convalescence of a cachectic case unfortunately neuroses of all kinds are only too common.

[This paper is important, as it draws attention to some of the unusual characters to be found in this prolonged disease; all are explained by the septicaemic condition and the irritation produced by the toxins elaborated by the organism, but it requires very careful differentiation to distinguish between a true complication and a distinct condition occurring in a patient whose blood still contains agglutinins of a past infection. The great enlargement of the spleen and liver causing difficulty of diagnosis from kala azar, the reviewer has experienced; the spleen was punctured for diagnosis and the patient died; the spleen weighed 56 oz. and the liver 104 oz. Endocarditis is also not very uncommon and may be due to the *M. melitensis* as well as the ordinary pyogenic cocci. One case of Sir Patrick Manson's was diagnosed as infective endocarditis until a blood culture showed the true cause, and the reviewer has had two such out of 750 cases.]

P. W. Bassett-Smith.

Cantani (Arnaldo). Azione del Micrococcco Melitense sul Sistema Nervoso Centrale.—*Malaria e Malat. d. Paesi Caldi.* 1914. May-June. Vol. 5. No. 3. pp. 151–155.

In clinical descriptions of undulant fever many references have been made to symptoms indicating some changes in the central nervous system. Grocco noted bulbar signs, such as disturbance of cardiac and respiratory rhythm, with uncontrollable vomiting not associated with loss of consciousness. TOMASELLI mentions paralytic attacks. TIMPANO describes a case having on the fourteenth day of the fever intense occipital headache with photophobia, vomiting, delirium and clonic contractions. HUGHES describes a malignant type accompanied by headache, insomnia, delirium and vomiting.

The author gives in some detail the course of three cases with marked symptoms of central irritation, all of which recovered. The first was thought at the early stages to be a bad case of typhoid, but the serum reaction was negative for this but positive for undulant fever (up to 1 : 1,000) and the *M. melitensis* was cultured from the blood. The cerebral signs were headache, semi-coma, dilated and sluggish pupils and an increase of tendon reflexes; these passed off in 6–7 days, but the fever continued for three months. The second case was that of an infant with well marked undulant fever followed by a choreiform condition; the serum agglutinated the micrococcus up to dilutions of 1–800. There was no history of rheumatism nor cardiac lesion, and no cause could be demonstrated for the nervous symptoms other than the melitensis infection. The third patient, a woman aged 28, suffered from severe fever for three months, with sweats, enlargement of the spleen and other symptoms of undulant fever; this was followed for a further period of three months by slight irregular pyrexia. The agglutination reaction was positive up to 1–1,600 and the *M. melitensis* was isolated from the blood. Mental symptoms were severe and prolonged, there was semi-mania with periods of unconsciousness, etc., followed by a state of marked asthenia. The tendon reflexes were increased but there was no disturbance of sensation. After removal to a sanatorium these psychical symptoms passed off and the patient made a good recovery.

A knowledge that these various nervous symptoms may be produced by the action of the *M. melitensis* or its toxin should make observers careful to differentiate etiologically all such cases occurring in an endemic area by a careful blood examination.

[The author has previously described similar conditions in cases of undulant fever.]

P. W. B.-S.

STEFANO (Chirico). **Osservazione Cliniche sul Decorso della Febbre Mediterranea in S. Eufemia d'Aspromonte.**—*Malaria e Malat. d. Paesi Caldi.* 1914. May-June. Vol. 5. No. 3. pp. 186–188.

From March to October 1913, a small epidemic of undulant fever was present in Aspromonte, Reggio Calabria. This affected chiefly individuals from 30 to 60 years old. At first it was often difficult to diagnose the disease from malaria and typhoid, but generally the course was that of a moderately severe type of undulant fever, with sweats, articular pains, neuritis and remittent or intermittent fever. Four cases are described more in detail; one was particularly interesting, being complicated with mucous haemorrhages from the mouth, epistaxis, purpura, and finally haematuria.

P. W. B.-S.

Martelli (P. N.). Contributo alla Conoscenza della Flebite nella Febbre Mediterranea.—*Policlinico.* sez. practica. 1914. Sept. 13. Vol. 21. No. 37. pp. 1313–1315.

Reference is made to the observations of Cantani demonstrating the occurrence of phlebitis as a complication of undulant fever. Having had considerable opportunity of observing cases of the fever, both in and out of hospital, the author describes in detail a case of his own in which this symptom was present. The condition was noticed on the sixth day after admittance to hospital and the eleventh day of the disease; it affected the left lower limb, and lasted fourteen days. In this case and in those of Cantani marked anaemia was present, which was looked upon as predisposing to the phlebitis. The examination of the blood showed that there was a marked relative decrease in the polynuclear leucocytes, and a definite leucopenia. Treatment with Trambusti-Donzello's serum gave satisfactory results.

P. W. B.-S.

Maillart. Fièvre de Malta contractée à Genève.—*Rev. Med. de la Suisse Romande.* 1913. Dec. 20. Vol. 33. No. 12. pp. 921–924.

A detailed account is given of a case of fever during the summer of 1913 in the person of a woodman aged 36. The pyrexia was of a distinctly undulant type, made up of three waves and attended with profuse sweats, but without any other marked physical signs of disease. Blood culture and agglutination tests did not confirm the clinical diagnosis of undulant fever, but these were not carried out until the patient had almost recovered from the third attack of pyrexia and the author thinks that, as the disease was of so benign a form, it is possible that no antibodies might have been then present and that the *M. melitensis* was unlikely to be in the peripheral blood. The interesting factor in the case was that the man had during some months previous to the onset of the disease been employed slaughtering sheep which had come direct from Algeria, but he had never had anything to do with goats.

[This case is of interest, but is not sufficiently definite without further confirmation to incriminate Geneva as an endemic centre of undulant fever.]

P. W. B.-S.

Sergent (Edward). Le Fièvre Ondulante: Diagnostic et Traitement. Epidémiologie et Prophylaxie.—*Paris Médical.* 1914. Aug. 1. No. 35. pp. 224–226

The author discusses the methods of diagnosis and treatment of undulant fever, with a few remarks on the epidemiology and prophylaxis. The clinical variations of the disease are so great that diagnosis is often very difficult. The serum agglutination test was for a long while believed to be as reliable as the Widal test for typhoid, but lately many irregularities have been noted making the reaction less useful. For this method the following factors have been postulated as necessary:—(1) A microbe not agglutinated with normla serum or that taken from a patient suffering from a disease other than undulant fever; (2) a microbe which shall always be agglutinated by a serum from any case of the disease due to this microbe. With regard to the first, it is difficult to recognise a normal serum owing to changes which may be produced by slight attacks, or even the ingestion of different foods. It is known that non-specific agglutinins frequently occur but most often in pyrexial conditions as typhoid, typhus and tubercle; these have been shown by NÈGRE and others to disappear on heating the serum for half an hour at 60° C, but this heating also destroys some of the specific agglutinins; with a heated serum, therefore, a positive reaction is conclusive, whereas a negative one is not. With reference to the second postulate, we have to recognise that there are great differences in the strains of the *M. melitensis*, the most important being that known as *M. paramelitensis*; these individual variations should be carefully noted and registered, for their use has often caused considerable error.

He states that one fifteenth of all the cases from Algeria and Central France have been treated with an anti-melitensis antitoxic serum prepared by NÈGRE and himself, with good results, but that in three cases, one from Paris and two from Corsica, in which the serum had not been tested against the strain used to immunise the horses, no good result followed; this shows that a polyvalent serum must be employed. He points out the danger of carrying out serum reactions without using the proper precautions, and quotes a case of fever with a deep abscess which led to an unfortunate result. This uncertainty with the serum test makes it important to use also blood, milk, and urine cultures if possible, but the author still thinks that the former should not be omitted as it is always useful and often sufficient, proper precautions being taken as to age of culture, clearness of emulsion, methods of observation and reliability of the strain (one that does not auto-agglutinate and reacts easily with immune serum) and heated serum being used. He states that the microscopic method should always control the sedimentation and that a time limit is unimportant. If these conditions are carried out, a positive reaction in a dilution of 1:50 is definite.

Undoubtedly the principal reservoir is found in the troops of goats in the endemic areas, but man and other animals may act as carriers. There are also many other means of contagion and the *M. melitensis* appears to pass easily through mucous membranes. The methods of prophylaxis are, cook all food and milk, notify all cases and disinfect; inspect animal houses and interdict importation of goats without bacteriological examination.

P. W. B.-S.

BETTENCOURT (Nicolau). (i) **A Diagnose Laboratorial da Melitococcia (Febre de Malta).**—*Medicina Contemporanea.* 1914. May 31. Vol. 32. No. 22. pp. 171–176.

(ii) **Le Contrôle Bactériologique de la Mélitococcie chez l'Homme et chez les Animaux.**—*Arquiv. d. Inst. Bact. Camara Pestana.* 1914. June. Vol. 4. No. 2. pp. 195–209.

i. This is a critical review of the various methods that are employed for the diagnosis of undulant fever, giving extracts from the chief papers on the subject up to date (1914). As the author has had many years of personal experience in laboratory work, the conclusions which he has come to are of special interest and are here given briefly :—

Procedure for man :—

(1) To isolate the pathogenic organism—(*a*) By blood culture, 5 cc. of blood are obtained during a febrile period, if possible at the height of the wave, mixed with 10 per cent. citrate solution and put into 100 cc. of nutrient broth+2 reaction, incubated at 37° C. for six days and then sub-cultured on to solid media. (*b*) From urine taken either at the end of a wave or during convalescence. The method may be assisted by mixing some strong anti-serum to agglutinate the organism ; then centrifuge and plate.

(2) Demonstration of antibodies—(*a*) 4 or 5 cc. of blood are obtained, the serum is separated from the clot and heated to 56° C. for half an hour, and tests are put up for agglutination in dilutions of 1 : 50, 1 : 100, 1 : 200, and 1 : 400. Two or more strains of the *M. melitensis* should be used and the strain *M. paramelitensis* avoided, 1 cc. of the diluted serum being used with the emulsion made from a young culture, and the result read off in 24 hours. This should be verified by specimens incubated for 2 hours at 37° C. Controls of normal serum are put up at the same time. Negative results require repeating. (*b*) Fixation of complement—useful when agglutination reactions are negative, or to confirm their results. The antigen is made from *M. melitensis* or *M. paramelitensis* in saline solution, 100 million per cmm., heated for one hour at 60° C. For complement fresh guinea-pig serum is used, and the usual haemolytic system, the results being read off in 12–24 hours. If the results are negative, they should always be repeated with a fresh sample of blood.

For animals—(1) Test for specific agglutinins in the serum as in man. For agglutination reactions with milk, six or eight drops of acetic acid may be added to 15 cc. of milk, which is shaken and filtered repeatedly so as to obtain a clear limpid fluid, or the whole fluid can be used, but the results are less reliable than serum reactions. (2) Isolation of the *M. melitensis* from the milk (care being taken to disinfect the teats and the hands of the operator) ; this is sedimented and plated directly on to nutrose or glucose media.

A short bibliography is added.

ii. This is a very well written description of the laboratory diagnostic methods utilised for the differentiation of undulant fever in man and animals. Though it covers thirteen pages there are no novel points to refer to. The author regards blood culture as being the most definite method, spleen culture being too dangerous and urine culture too difficult for practical application. For serum reactions he insists on the use (1) of a living emulsion made from a 24-hour growth on solid media of *M. melitensis* ; (2) a strain that does not agglutinate too easily (not *paramelitensis*), or with other infected sera ; (3) the serum to be heated to 57° for half an hour, but a small portion kept unheated to be tested also if a negative reaction is obtained ; (4) a series of dilutions, 1 : 50, 1 : 100, 1 : 200, 1 : 400, to eliminate paradoxical reactions ; (5) the sedimentation method, using 1 cc. of diluted serum and a time limit of two hours with the tubes in the hot incubator.

The method of complement fixation is described and recommended to be used when the serum reaction is negative or to confirm this, but in all cases where a negative result has been obtained it is wise to obtain a new sample of blood some days later and carry out all the tests again.

For diagnosis in animals he does not speak favourably of the lacto reaction even when the various modifications are employed, but depends upon serum agglutination and culture from the milk.

A very important consideration is pointed out with regard to agglutination reactions, namely that the minimum limit of dilution for diagnosis depends upon two factors which are very variable: the agglutinating capacity of the micrococcus and the agglutinating power of the serum. The sensitiveness of the particular strain of the micrococcus must be known in fixing the minimum limit, and it must be remembered that heating the serum reduces the chances of error enormously, yet occasionally it may cut out the specific agglutinin. Hence the unheated serum should also be tested.

P. W. B.-S.

FERRO (Paolo). **Sul Valore Clinico della Sieroreazione di Wright.**—*Riforma Med.* 1914. Vol. 30. No. 7. pp. 261–264.

The author commences with a short account of the difficulties attending sero-reactions in *melitensis* infections, and the modifications that have been suggested; he then describes his own technique. He agrees with most recent workers in preferring the macroscopic method, reading off the result after two hours in the hot incubator and using an emulsion made from a reliable culture not more than 36 hours old. Working with seven strains and a large number of different sera he found considerable variations, one strain which was very similar to *M. melitensis*, Br. Nicolle, being very unreliable. Heating the serum reduced the agglutination value considerably and he does not consider this to be either necessary or desirable. The use of a killed emulsion of a well-tested strain heated to 60° C. and preserved by the addition of formalin he thinks is very advantageous, for it keeps well for over a year and with it more definite comparisons can be made.

From his researches he concludes that the practical value of WRIGHT's method is very great, but that the utmost care must be taken to avoid using unsatisfactory cultures, namely those that agglutinate too easily. With a good strain a dilution of 1 : 100 is sufficient for diagnosis; heating the serum is unnecessary and dead cultures can be most usefully employed.

P. W. B.-S.

TALLO (F.). **Ricerche Sperimentali sulla Latenza del Micrococco di Bruce nella Bile.**—*Policlinico.* Sez. Pratica. 1914. June 28. Vol. 21. No. 26. pp. 925–926.

Recent epidemiological research has shown that in microbic diseases it is of the greatest importance to determine by what means "carriers" remain infective and how they disseminate the specific organism. The possibility of the *Micrococcus melitensis* living in the gall bladder has been recognised and the author carried out experiments both in vitro and in vivo to prove whether bile was a good culture medium or not. In vitro, using a four-day agar culture (Kral's strain) inoculated into sterile bile of various laboratory animals and sub-culturing from day to day, he found that the organism continued to grow well, showing no abnormal morphological changes. Five guinea-pigs were inoculated intravenously with 1 cc. (or a sub-lethal dose) of an emulsion made from a four-day agar culture. The results are shown in the following table:—

Guinea-pig	Weight.	Day of Examination.	Persistance of M. M.	
			Blood.	Bile.
1.	430 grms.	24 hours	+	+
2.	410 ,,	3 days	+	+
3.	425 ,,	6 ,,	+	+
4.	460 ,,	9 ,,	—	+
5.	400 ,,	12 ,,	—	+

The organism disappeared from the blood after the sixth day, but was recoverable from the bile on the twelfth. In vivo the bile appears to be a good culture medium. This fact is of great importance when dealing with carriers of the disease.

[The *M. melitensis* was recovered from the bile of human cases in two out of eight examined in 1905 by Kennedy, and from faeces by Eyre once.]

P. W. B.-S.

Cummins (S. L.), Coppinger (C. J.) & Urquhart (A. L.). **Further Observations on the Presence of Antibodies for *Micrococcus melitensis* in the Milk of English Cows.**—*Jl. R. Army Med. Corps.* 1914. July. Vol. 23. No. 1. pp. 36–41.

After referring to the work done by Kennedy and Bassett-Smith on samples of cows' milk obtained in London, in which agglutination of the *Micrococcus melitensis* was obtained, and to the fact, shown by Horrocks in Gibraltar and Shaw in Malta, that cows may contract a true *melitensis* infection, the authors describe some fresh work which they have lately carried out. From one dairy in London the milk of seven cows was examined; of these two gave positive results, one agglutinating the strain of *M. melitensis* used in dilutions varying from 1 : 250 to 1 : 1,000. The milk and serum of this one cow were further examined in detail with regard to agglutinins, opsonins, and deviating substances. The following points were determined: (1) The milk, whey and blood serum all agglutinated in corresponding dilutions; (2) The agglutinins were demonstrable in the milk when tested almost immediately after drawing; (3) The agglutination did not depend upon the presence of acids; (4) The agglutinins were thermostabile, paradoxical reactions being produced by heating the milk to 57° C. for 25 minutes; (5) The milk contained no agglutinins for other specific organisms; (6) The whey after three weeks agglutinated the *M. melitensis* as powerfully as before; (7) Filtration gave varying results.

The milk, whey and blood serum of this particular cow contained thermostabile opsonins for the *M. melitensis.*

No deviating substances were demonstrated in the inactivated milk, but once the inactivated serum gave a positive result, which, however, was not confirmed. The authors conclude that the milk, whey, and serum of the cow tested behave to the *M. melitensis* as those of an animal suffering from the disease or immunised to the organism.

[The chief importance of this examination depends upon the definite relationship of the agglutinins in the blood serum and the milk, but the almost complete absence of complemental deviations with milk, whey, and serum tends rather to discount the positive agglutination and opsonic results.]

P. W. B.-S.

IZAR (Guido). **Sulla Chemoterapia dell' Infezione Melitense. Nota 2.** —*Pathologica.* 1914. Nov. 1. Vol. 6. No. 144. pp. 536–540. With 7 charts.

In 1913 the author made a number of experiments on rats which showed the prophylactic and curative action of ethyl-copper-chloride in experimentally produced melitensis infections (this *Bulletin*, Vol. 3, p. 219). In the present paper he describes a further series in which rabbits were used, these animals being preferable as in them the disease runs a longer and more regular course. The animals had a fairly regular average weight of 1900–2000 grams, an emulsion of a 48-hour culture of M. Br. (Micrococcus of Bruce) was employed in each case, but the amount injected varied in different experiments ; the inoculations were usually made intraperitonally. A normal dose was first estimated, and for the experiments ten times this was used, namely one that killed the rabbit in about 28 days. When the animal's serum gave an agglutination reaction of $\frac{1}{200}$ or over, the treatment was started and usually six injections were given at intervals of 1–2 days. The drug was either given in a dose of ·05 gm. in a watery solution intravenously or ·15–·25 gm. as a base, intramuscularly. Tables of the experiments are provided showing the weights of the animals, etc., and charts with the course of the temperature and agglutinative curves in treated and untreated animals. The results obtained showed that the alkaloid had a specific curative action, arresting the infection in 68 per cent. of the cases if the treatment was started before the ninth day, but if commenced after that time no animal was saved. In the animals which were recovering after receiving injections the agglutination curve rose high (1 : 5,000-1 : 8,000) and continued high when the temperature was normal.

[These results are of great interest as they were founded on a very large number of accurately carried out experiments.]

P. W. B.-S.

BOOK REVIEWS.

TIBBLES (William). [LL.D., M.D. (*Hon. Causâ*) Chicago; L.R.C.P. Edin.; M.R.C.S. Eng.; L.S.A. Lond.]. **Dietetics, or Food in Health and Disease.**—x + 627 pp. 1914. London: Baillière, Tindall & Cox, Henrietta Street, Covent Garden. [Price 12*s.* 6*d.* net].

This is a comprehensive, concise work, written so simply that it is quite readable in spite of the mass of detail with which it deals. It is divided into two parts, the former of which treats of the physiology and physics of food while the latter is devoted to the diet necessary in various diseases. The tables on food values supply a distinct want. It is found that protein starvation is not uncommon amongst the British poor, who have to live upon a diet of tea and bread and butter, with an occasional bloater or other appetizer. Such a diet, though it may produce sufficient heat, does not give the consumer strength and endurance, and the author strongly recommends a free use of peas, beans, lentils, and nuts when the cost of meat, poultry, fish, eggs, or milk is prohibitive.

He finds that mental work cannot be done so well with alcohol as without it, but he allows that small doses of beer, wine, or diluted spirits are permissible for the brain worker whose stomach has lost tone through a sedentary life, overwork, or worry. Like other physiologists, he states that alcohol does not give strength or power of endurance, but that it is a poison to protoplasm and depresses cellular activity.

Soldiers "can bear hunger and fatigue, heat and cold, snow or rain, better without it." On the other hand, the caffein of tea and coffee increases the capacity for both muscular and mental work, and with moderate doses there is no evidence of reaction. Smoking tea in cigarettes is apparently the most injurious way of consuming it, great excitement of the nervous system being caused. Coffee has the advantage of warming the body in winter and cooling it in summer by stimulating the sweat glands. Coca is used extensively in South America to enable the body to endure prolonged exertion without food and to prevent nervous and muscular exhaustion, but excessive use of it diminishes the intellectual powers and deteriorates the moral faculties.

The author asks, but declines to answer, the question, "What is a moderate amount of tobacco?" The reviewer's experience is that any number of cigarettes exceeding 50 per day is dangerous, and that those who smoke between 20 and 50 daily are running a risk which most nervous systems cannot stand. The author mentions tobacco amblyopia, but does not seem to be aware that this is almost unknown among those who only smoke cigarettes, especially if they are teetotallers.

The diet of Europeans in the tropics is wisely considered and on this point Sir HAVELOCK CHARLES'S advice is quoted.

The first chapter of the second part is devoted to diseases of the stomach and consists of 56 pages. We notice that the author recommends rectal feeding for painful ulcer of the stomach for 15 days, though he allows upon another page that the daily value of the food absorbed by the rectum is only an average of 390 calories, or one-sixth of what is required by a person whose metabolism is at a low level. He gives under the various headings of the book the pros and cons, and quotes here WYNTER, who said: "Nutrient enemata satisfy the mind rather than the body." We cannot quite endorse the old-fashioned view that "the treatment of duodenal ulcer is the same as that of gastric ulcer."

Under the heading of chronic tropical diarrhoea the ordinary views about the diet of sprue are briefly mentioned and medlars are suggested as a substitute for strawberries.

In the diet of most diseases there is little new, but gout is defined as "retention-uricaemia," and stress is laid upon the importance of the patient finding out for himself by the experimental method what articles of food and drink he should eschew.

In typhoid fever "moderate feeding" is commended, such as adding to the ordinary liquids two or three raw eggs, farinaceous foods, and custard and jelly *ad libitum*. The author says that he has used these additions for more than thirty years and can strongly recommend them. When typhoid patients are badly fed, their tissues are rapidly destroyed and acidosis occurs. Moreover, he holds that carbohydrates prevent the toxaemia, by avoiding the formation of toxins in the cellular tissues. Most medical men are aware, but the general public is not, that reliance to a great extent cannot be placed on beef-tea, soup, broth, and other meat infusions for feeding fever patients. Even when the "grounds" are included a pint of beef-tea contains only the nutriment of one ounce of beef. Moreover, the salts are out of proportion to the nutriment and the result is increased thirst and the addition of waste nitrogenous matters to be excreted. Eggs come next in importance to milk; two eggs contain 13·5 grammes of protein, 11·6 grammes of fat and 163 calories, that is, more nutriment than a pint of beef-tea at a quarter of the cost.

To those who are chiefly interested in tropical diseases it is possible that the final chapter of the book on Vitamines and Deficiency Diseases may prove the most attractive. The author may be congratulated upon having achieved the aim mentioned in the Preface which was "to give an account of the most recent researches in these subjects and to place the results in a proper light." Vitamines are present in fresh unboiled milk, eggs, meat, yeast, meat extract, in all grains which have not been deprived of the pericarp, in some beans and in all rapidly-growing vegetables. Half of the mortality in Manila is said to consist of infants under one year of age and half these infants show some sign of beriberi because they are breast-fed by unhealthy mothers. But the author does not lay stress on the interesting fact that ailing babies become healthy when rice-polishings are administered to the nursing mother.

Zein or maize protein is deficient in tryptophane; it does not cause growth and is insufficient to maintain the life of mice. It is suggested by the author that the presence of pellagra in the United States to-day in contrast with its absence during the Civil War is due to the effects of modern milling, by which the maize loses 75 per cent. of the fat, the germ and the important substances of the pericarp. Sailors, fed for a long time on dried or pickled meat, dried potatoes, rice, bread and biscuit, often develop scurvy and beriberi, yet they recover when fed on "fresh meat, fresh vegetables, yeast, Katjang idjo beans and testicular extract which contain vitamines."

It is stated that yeast contains several vitamines, and to certain fresh vegetables, such as potatoes, cabbage, carrots, onions, must be added "dandelion leaves", which are said to be particularly rich in vitamines. Scurvy, it is maintained, is due to a monotonous diet, but chiefly "to the absence of *freshness* in the food."

A short resumé is given of the connection between polished rice and beriberi and the experimental polyneuritis of fowls. The so-called beriberi of Brazil is also mentioned, and the 15·6 per cent. of cases among railway navvies who died. They ate no rice, but lived on a varied diet of dry biscuit, dried meat, cured fish, tinned meat, tinned fish, beans and macaroni. The number of cases lessened when fresh meat, potatoes and onions were included in the diet.

The chief theories with regard to the etiology of pellagra are mentioned, and the author is of opinion that the theory of association of this disease "with the consumption of maize has not given place to any theory supported by an equal weight of evidence."

This useful book ends with three pages on the rôle of the lipoids and the inorganic salts in metabolism. It is concluded that the lipoids essential to the organism are probably not vitamines, nor are they amino-acids, but they are essential to enable the vitamines to enter the living cells of the organism.

F. M. Sandwith.

Hindle (Edward), [B.A., Ph.D.]. Flies in Relation to Disease. Blood-sucking Flies.—xv + 398 pp. With 88 text-figs. 1914. Cambridge: At the University Press. [Price 12*s*. 6*d*. net].

It is not too much to say that this is the best-digested treatise on blood-sucking flies, in their actually established relation to disease, that as yet appeared.

The outworks of the book consist of a short general introduction in which some historical and ontological aspects of the subject are tersely and lucidly considered, and of a more particularised introductory discourse on the structure, biology, and classification of the Diptera. These two chapters lead up to a formal list of blood-sucking flies that are known to transmit infection, arranged by families in systematic order. Thereafter, each family included in the list is reviewed separately; first in respect of its structural features, biological character and relations, and taxonomic composition; and then in specific detail, with regard to its pathogenic significance and sanitary import. This last aspect of the subject includes —in every ascertained case—a precise account, descriptive and historical, both of the processes of infection and of the morbific agent transmitted.

For instance, in dealing with the family *Culicidae* a survey of the external characters, internal structure, post-embryonic development, natural history and classification, and a review of the pertinent groups and species, is followed by critical accounts of the several infections transmitted by Anophelines and Culicines, and of the parasites of malaria, filaria, etc., in all their relations to their hosts, and by a succinct and judicious discussion of preventive measures, especially those which entomological research suggests.

The excellence of the book is manifested in many ways, not by any means least in its clear and even style, its proportion and balance, and its transparent fairness in matters that at times have been somewhat obscured by controversy, this last quality being seen to advantage in the pages dealing with the history of malaria.

It is perhaps a little unfortunate that the precision of the main title of the book—Flies in Relation to Disease—excludes the *Simuliidae* and the blood-sucking Chironomids from consideration, but the author of course is justified in restricting himself to the limits of admitted fact. It is also rather a pity that the author has incommoded himself with the terrible burden of names that has accumulated about the genus *Anopheles*; a critical redaction of the species according to geographical regions would have been at once more instructive and more effective.

The author is to be felicitated on his frank statement that the prevention of protozoan infections in the tropics is very largely an entomological problem; those, however, who know what a tropical village and its inhabitants are like may yet feel some doubt that the destruction of *Stegomyia fasciata* is a "comparatively simple" matter.

A. Alcock.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

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APPLIED HYGIENE IN THE TROPICS.

By Colonel W. G. King, C.I.E., I.M.S. (Retired).

REPORTS.

Sierra Leone (1913).*

In Freetown registration of vital statistics is compulsory; elsewhere in the Colony, Hospital and Dispensary Returns only are available. Of 2,811 out-patients, 7·5 per cent. suffered from malaria. There is reason for assuming that, in the majority of these cases, the diagnosis was based upon clinical symptoms. In future, cases thus diagnosed and those microscopically verified will be differentiated.

In Freetown eight cases of sleeping sickness were under observation during the year. "Suspicious cases" were said to have been found in the Koinadugu District. Dr. Rice, in adverting to these, thinks it is open to question whether the disease is more prevalent than when first described in Sierra Leone by Winterbottom in 1803, and by Grattan in 1906.

Twenty-six cases of leprosy were diagnosed. Although nominally segregation is compulsory, it is not enforced; the matter is under consideration by the Government.

As far as statistics available allow the facts to be ascertained, it is estimated that 1·32 per mille of the inhabitants of Freetown suffer from tuberculosis. Of the total of 28,811 out-patients treated in the Hospital and Dispensaries, there were 338 cases of syphilis. Dr. Orpen, in charge of Batkanu, is of opinion that congenital syphilis is comparatively rare.

The average number of European officials resident during 1913 was 131, of whom 22·7 per mille died. Of the total resident officials (244), 5·32 per cent. were invalided. In the case of those who resided on the Hills, "the general health was satisfactory," except in the case of those who proceeded to the Protectorate, where they were exposed to conditions incident to Rest Houses being within native villages.

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* Sierra Leone.—Annual Report on the Medical Department, 1913; [Principal Medical Officer, T. E. Rice; Senior Sanitary Officer, R. H. Kennan.] F'cap. 1914: Printed by Waterlow & Sons, Ltd., London.

Appended to the Principal Medical Officer's Report are the Annual Reports of individual hospitals and dispensaries. He calls special attention to the fact that some of the latter are in charge of native dispensers, concerning which method he remarks as follows:—

> "How much harm is done by the prescribing of remedies by persons who are only qualified to dispense it is difficult to estimate, but it is not to the credit of European medicine that the practice of it should be carried on by unqualified persons; and I am inclined to think that the interests of the public health would be better served were the centres at which dispensaries have been established visited once a month by a travelling Medical Officer accompanied by a Dispenser."*

The most noteworthy feature of the Hospital Returns is that in the Colonial Hospital, Freetown (Dr. J. Wallace COLLETT) the operations have increased from 44 in 1902 to 365 in 1913. Amongst these were 18 cases of elephantiasis of the scrotum, and one splenectomy.

Dr. A. YOUNG was in charge of the Laboratory of the Colonial Hospital. This has been recently improved in equipment. Dr. BUTLER worked at yellow fever investigation as well as Drs. DALZIEL and JOHNSON of the Yellow Fever Commission. As an hypothesis founded on certain observations, they suggest that "the presence of albumen in suspected yellow fever cases loses its value, and renal casts must straightway be looked for."

Sanitary Section.—Dr. KENNAN shows that the measures to secure the malaria-free condition of Freetown inaugurated in 1899 lack completion; nevertheless, he is able to record that, during 1913, some progress has been made by the local authorities.

The following mosquito indices were found in Freetown:—"In February seven infected compounds were found out of 250 examined, or 2·8 per cent.; in May, 14 out of the same number, or 5·6 per cent.; in August, 10, or 4 per cent.; and in December (from 15th to 20th) 8, or 3·2 per cent." Dr. BUTLER undertook the duty of ascertaining the malaria endemic and splenic indices in Freetown. The following are the conclusions arrived at by him:—

> "Towards the rainy season the apparently healthy children of Freetown, between the ages of three and ten years inclusive, show the presence of 'active' malaria parasites in fifty out of the hundred examined. (2) The percentage of infected children is alike for the children attending the Mohammedan and Christian schools. (3) Of the children showing the presence of malaria parasites approximately 83 per cent. harbour the subtertian form and 16 per cent. the quartan form. (4) Between the hours of 10 a.m. and 12 noon the temperature of children harbouring malaria parasites does not appear to be appreciably raised above that of children not harbouring the parasites. (5) The splenic index was found to be 43 per cent. It is shown in the results that the children harbouring parasites in their peripheral blood have a considerably higher splenic index than those not harbouring parasites."

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* The writer believes that all who have watched the growth of European methods amongst uneducated tropical races will agree with the opinion that, whatever the system adopted, there should be no pandering to the belief that an unqualified man, provided with stock medicines, can successfully uphold the value of European medical science. No better way could be suggested for impeding civilizing influences at the hands of the white man

The standard thus carefully arrived at will be of great utility in gauging the efficiency of the long-delayed anti-malarial measures at Freetown.

As part of the anti-malaria work Dr. KENNAN shows that the flow of Moore's Brook—an intermittent stream—has been regulated by the cutting of a sufficiently deep channel in the rock, so that "neither adventitious masonry nor concrete supporting work" has been found requisite. In 1903, Dr. W. T. PROUT advised the free use of cement surface drains, as he was much impressed with the results of these adaptations to ten streets. He, however, recommended a complete survey of the town before further progress was made. Dr. KENNAN summarises thus: "The ordnance survey of the town is now in progress; the comprehensive scheme of drainage waits."

The intercepting drain at Brookfields originally advised by Professor SIMPSON is still in process of execution. Dr. KENNAN advocates, as a preliminary to making a concrete invert, exploratory borings so as to ascertain, should water under pressure be struck, whether a sufficient depth to secure interception has been arrived at. He regards the whole work as of much sanitary importance, and one that it is likely will be instructive in its results.

During the year, Dr. W. ALLAN was appointed Acting Medical Officer of Health, Freetown. He has undertaken much hard work in ascertaining the extent to which wells afford breeding places for mosquitoes, and has noted where anopheles and culices, respectively, made their choice.

The provision of a water supply for Freetown is now in progress "by gravitation from streams from the Sugar Loaf Mountains." Dr. W. T. Prout, when Principal Medical Medical Officer, in 1902, expressed the hope that *when* the water supply was an accomplished fact *all* wells in the town would be closed. This advice is supported by the report of the Acting Medical Officer of Health that these form "a fertile source of mosquito breeding," and also because in 466 instances, where measurement was resorted to, the average distance from cesspools "was found to be 37·3 feet."

Inspection of slaughter-houses is conducted in Freetown, and it is recorded that among 4,098 bullocks there was infection with *Cysticercus bovis* in 20 cases.

The Senior Sanitary Officer makes a special plea as to the necessity for providing a separate Port Health Officer for Freetown, instead of expecting the combined duties to be performed by the newly-appointed Medical Officer of Health. He shows that a total of 666 steamers entered the Port during 1913.

Both the Principal Medical Officer and the Senior Sanitary Officer comment on the insanitary condition of rest-houses for officials on tour, these being at times nothing but huts reserved in the interior of native villages that may have been inhabited by natives but shortly before the arrival of an official. The latter officer points to the necessity of better arrangements as the logical sequel of "improvement of the housing at headquarters."

Remarks.—The "Colonial Office forms," which require information as to practical application of sanitary measures, are duly appended to the Report, and disclose facts showing that the Health Officer, Freetown, has much work before him before the Municipal Sanitary organisation can be rendered complete. For example, neither in the case of the 77 houses of Europeans nor of the 5,239 houses occupied by natives has any mosquito proofing been undertaken, and this is equally true of residences of railway, civil and military officials. From a Note attached to the form as to buildings, it is not possible to ascertain from official sources what, if any, buildings have been erected without sanction. Presuming there are five inhabitants per house in a population of 34,090, there are enough private latrines for only 625 inhabitants. Instead of about 1,600 cubic feet of solid and fluid excreta, which might be expected from this population (largely grain and vegetable feeders), the total removed from the town site is about the product of 2,000 of all ages. The rest of the excreta is disposed of either in cesspools or on the town site. Where pails are employed by the Municipality there are no night soil men to clean the latrines, and no arrangement is made to cleanse the pails. The method of transport and collection of rubbish is probably both inefficient and extravagant of human labour. Table 10, as to "work of disposal of excreta, refuse and offal," as also Table 11, stating "daily numbers of cartloads," etc., are blank—leaving scope for surmise as to methods employed—or their absence. Of 928 barrels employed for water supply in a town where yellow fever is not an unknown visitor, 63 only are mosquito proofed. The total year's work as to drains—which according to Dr. KENNAN, Dr. PROUT and their predecessors are desirable —was an addition of 300 lineal yards; the nature of the drain is, however, unstated. Allowing for no work on Sundays, it required eight hours' labour for five men to oil a little over eight drains or cesspools per day.

GOLD COAST (1913).*

Medical Section.—During the year, the combined medical and sanitary staff consisted of 53 Medical Officers with one Principal Medical Officer and his Deputy, two Provincial Medical Officers, and three Senior Medical Officers. The Sanitary Staff consisted of the Senior and Junior Sanitary Officer, four Medical Officers of Health, four European Sanitary Inspectors, aided by a Native Sanitary Staff of 41 male Sanitary Inspectors and two female Sanitary Inspectors. The area of the Colony is 80,235 square miles and the population 1,501,000.

The Medical Officers treated 2,565 cases of malarial fever against 2,268 in the preceding year. The diagnosis was verified by microscopic examination in the case of 170 Europeans and 460 natives. No death amongst the cases treated was recorded. There were 21 cases of blackwater fever with seven deaths. One of the cases proving fatal was that of a native, to which Dr. HOPKINS draws special attention as rather an unusual circumstance. Of yellow fever it is stated that it is "looked upon as an endemic disease." Eleven cases occurred in Europeans with a mortality of 54·5 per cent., and nine amongst natives with a mortality of 22·2 per cent. The sanitarily important fact is stated that "one case (European) occurred at Kintampo, Northern Province of Ashanti, and four cases (three Europeans and one native) occurred in the Northern Territories." Apparently, there is no previous record of yellow fever in these dependencies. Such extension cannot be viewed without alarm; but the Principal Medical Officer is able to state that, following energetic action by the Senior Sanitary Officer and staff, no epidemic resulted. Of guinea worm 1,524 cases (or 231 cases more than last year) came under treatment. In reference to the possibility of prevention, the opinion is given that "it is difficult to get even the educated native to boil his drinking water." Nevertheless, the Medical Section of the Report ends with a statement of faith in the steady advance of hygiene in the Colony, as reflected in the statistics dealing with Europeans:—

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* GOLD COAST.—Medical and Sanitary Report, 1913. [Principal Medical Officer, F. G. HOPKINS; Senior Sanitary Officer, D. ALEXANDER.]

> "It will, however, be observed with satisfaction that the general death-rate is reduced from 1·96 to 1·12 in the preceding years to 0·86 for 1914, and that is the fact we always hope for from year to year, basing our hopes on the large strides which sanitation is making in this Colony."

Sanitary Section.—It is impossible to show how far the native population has benefited by the sanitary improvements effected, owing to the collection of vital statistics not being general.* The sinews of sanitation being money (for "within human limitation, health is purchasable") the Senior Sanitary Officer, after pointing to numerical deficiency in his staff, gives pride of place to a consideration of the money placed at disposal. Under general sanitation, estimates allowed £43,822, and no difficulty in spending this seems to have occurred; but, in addition, "£41,350 was ear-marked for sanitary improvements under Public Works extraordinary . . . . and £26,035 was expended"—a short expenditure as to which no explanation is offered in the Report.

SOUTHERN NIGERIA (1913).†

Medical Section.—In the absence of vital statistics, data as to disease prevalence are necessarily confined to deductions from Hospital Returns. According to these, if the years 1911 and 1912 be excepted, in the period from 1907 to 1913 there was no diminution of malarial fever exhibited.

Trypanosomiasis is confined to the Eastern Province, where there were under observation and treatment 378 cases. In an appendix to the Report, Dr. SCOTT MACFIE records much useful investigation, which leads him to conclude: "The morphology of the trypanosome differs in some respect from that of the typical *T. gambiense*, and it is possible that it is not the same species. It remains to determine the species of insect that transmits the disease to man in Eket and the animal that acts as reservoir." He shows that the sleeping sickness of Eket is characterized by its chronicity and mildness. Dr. GALLAGHER supplies a paper discussing the history of and preventive methods against this disease, showing that Mr. EAKIN and Dr. R. W. GRAY and Dr. FORAN have, since 1906, taken action on the subject. Dr.

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* Figures given on page 87 for the principal towns yield on the census (1911) of the aggregate general population of 100,104 a death rate of 24·1 per mille.

† SOUTHERN NIGERIA.—Annual Medical and Sanitary Report, 1913. [Principal Medical Officer, T. HOOD; Senior Sanitary Officer, J. A. PICKELS.]

GALLAGHER makes a plea for regarding well regulated agriculture with its necessary clearings as the best feasible mode of defence against the trypanosome.

In the Eastern Province, filariasis is present to an undetermined extent of prevalence; in the Western Province, 40 per cent. of the adult subjects examined exhibited microfilariae. *Filaria nocturna* and *diurna* are found in about equal proportion—the *perstans* being comparatively rare. About 0·17 cases medically treated are of tuberculosis; but the Principal Medical Officer considers tuberculosis is far more common than disclosed by the Hospital Returns. Leprosy is found in the Western and Eastern Provinces and on the left bank of the Niger. As to tetanus the P. M. O. states:—

> "This is very common in Lagos and prevails all the year round. Slight and neglected wounds of the feet are the usual mode of infection. Forty-six cases were treated, with 15 deaths, a mortality so low that it suggests the probability that the native may enjoy a certain degree of immunity to the disease. Anti-tetanic serum is used freely in the treatment."

It is considered fairly safe to estimate that ankylostomiasis is present in 50 per cent. of the people.

The average number of European officials resident was 842; of whom 22·8 per mille were invalided and 8·5 per mille died. In Lagos the death rate per mille of the general population was 29·1 in 1913, on an estimated population of 64,096.

[The rates for Lagos in the preceding four years show a marked diminution from the maximum of 37 per mille in 1909. Ebute Metta has been also fortunate; whilst, in 1909, its death rate was 38·2, in 1913, it had declined to 29·1. In both cases there was a marked diminution of the birth rate in the three latter years of the decade as compared with 1909 and 1910, which is not accounted for in the text; but, as the infantile death rate at Lagos in 1913 was 263·8 per mille of births, and in Ebute Metta 253·8, there does not seem much room for thinking that the death rates have been diminished by the smaller birth rate. Possibly, the estimated population of these two towns, on which the figures are reckoned, and the actual populations differed, in the period concerned, owing to special causes. Whilst the chances are therefore in favour of a considerable diminution of mortality which may be ascribed to sanitary improvements, its extent can hardly be safely gauged by the figures in question.]

Yellow fever was officially declared to exist in Southern Nigeria for the first time in its history. "Ten cases occurred in Europeans with four deaths, three in Syrians with two deaths, and 21 in natives with nil mortality." The P. M. O. suggests that the mildness of the disease in natives may not unreasonably be attributed to the possible fact that practically all are attacked in childhood.

Sanitary Section.—The Sanitary Staff consisted of the Senior Sanitary Officer with one Sanitary Officer, aided by three European Sanitary Inspectors and 24 native Sanitary Inspectors. In addition, there are entertained by the Railway and by Native Court Funds, 26 Native Sanitary Inspectors. Arrangements have been sanctioned by Government for the training of a better educated class of Native Inspectors.

The outbreak of yellow fever in Lagos and other ports brought about increased vigilance as to mosquito destruction, so that "the reduction in the total mosquito index from 11·1 in 1911 to 5·06 in 1912, and 3·77 in 1913, speaks eloquently enough of the work done." Dr. PICKELS has, however, cause for dissatisfaction in respect to work in this direction accomplished at Abeokuta, under Native Government which entertains a Health Officer "and a few poorly trained Sanitary Inspectors." He considers that it is from the territory thus administered that the first infection of a European with yellow fever occurred, and urges the desirability of better sanitary control of an area that must at all times otherwise be a danger spot to Nigeria.

A total sum of £2,466 was spent during the year on mosquito proofing of houses. The death rate from malaria was 4·2 per 1,000 cases treated amongst Europeans, and 3·02 amongst natives. In the interests of prophylaxis against malaria during 1913, 1,948,330 grains of quinine were issued free of charge.

The Senior Sanitary Officer* remarks on the rarity with which subsoil drainage is carried out by Engineers, but finds a good sign in the race-course at Lagos having been thus rendered in good order. He estimates that surface drainage demands in Lagos 80 miles of public street drains. A form advised by Professor SIMPSON has so far been laid down to the extent of 20,000 feet. During 1913, 4,385,861 square yards were cleared of bush.

In reference to dysentery, the Senior Sanitary Officer notes that an increase of recorded cases resulted owing to new arrivals in jail bearing this disease with them. The stools of new admissions were therefore systematically examined. He adds that the "water for prisoners is rendered sterile and kept in drums fitted with taps and good covers."

In the Central Provinces, tuberculous cases coming to notice were six times more than in 1912. It is proposed to establish a Sanatorium at Ibadan for consumptive prisoners.

It was expected that before the end of 1914 the water-supply scheme for Lagos would be completed. The Calabar water-supply scheme is also sanctioned. The water-supply for Abeokuta is now in working order.

In Lagos night soil collection is conducted on the pail system in an area of 117 acres out of a total of 1,500 acres of the Sanitary District of Lagos. The pails are conveyed by a steam tramway, and the contents are dumped into the deep sea. It is anticipated this method will have to be changed as the harbour is increasingly used by ships.

EAST AFRICA PROTECTORATE (1913).†

Medical Section.—Dr. MILNE considers that the epidemics from which the Protectorate has suffered are not reflected in his Hospital Returns; and he therefore regards with no regret a steady increase of patients, the figures for 1911 being 85,958; 1912, 93,408; 1913, 108,520. He holds that "the increase is an index of the expansion of the country attributable to augmentation of the European population bringing with it increasing commercial prosperity, together with medical activity and a yearly increasing number of natives under civilizing influences."

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* The Sanitary Section of the Report is signed by the Acting Senior Sanitary Officer, R. LAURIE.

† EAST AFRICA PROTECTORATE.—Annual Medical Report, 1913. [Principal Medical Officer, A. D. MILNE; Chief Sanitation Officer, W. J. RADFORD.]

In the Coast Zone anaemia is fairly common, and is usually considered due to malaria, although ankylostomiasis is also present. Diabetes was found amongst Indians, but not amongst Africans.* During the year there were three cases and one death from blackwater fever in Europeans. Amongst other races there were eight cases and two deaths from this cause. In the Mountainous Zone, on the one hand, and in the Kenia and Nyanza Provinces, on the other, there were three and one cases of black-water.

As no reliable vital statistics are available, the Hospital Returns are utilized. These are not analysed so as to exhibit localities from which cases are derived, nor is there anywhere quoted either the splenic or endemic index rates. Dr. MILNE is not in a position therefore to afford very definite information as to the extent of prevalence of malaria. He, however, shows that the number of cases treated has increased from 10,714 in 1911 to 12,656 in 1912, and 15,656 in 1913. He explains this increase as follows :—" Though this table shows an increase in the number of recorded cases, there is a distinct decrease in case incidence in localities where a general knowledge of the cause of this disease is being acquired."

Cerebro-spinal meningitis resulted in much mortality in the Kenia and Nyanza Provinces. Dr. Milne states :—" The visitation which broke out during the year was the most disastrous the Province of Kenia has experienced since occupation by the white man. . . . The District Officers variously estimated the excess rate at from 3 to 10 per cent."

At Kisumu plague prevailed, but it did not reach the Kenia Province.

Dr. Milne accompanied Professor W. J. SIMPSON, C.M.G., on his tour of inspection (during his deputation to Africa by the Colonial Office), and testifies to the strenuous efforts which followed towards the organizing of " a vigorous anti-plague campaign " and the drafting of a much-needed Public Health Code. The Chief Sanitation Officer, in referring to the same subject, gives it as his opinion that having regard to the existence of epidemics of unequalled magnitude, " the benefit the Division has received from his [Professor SIMPSON'S] experience and advice is incalculable."

Sanitary Section.—Dr. RADFORD reports that the sanitation division was brought into existence on the 1st April, 1913, the three Medical Officers of Health of Nairobi, Mombasa and Kisumu being transferred for the purpose ; but further appointments were made, including the Chief Sanitation Officer, four European Sanitary Inspectors, one Nurse and three Sub-Assistant Surgeons. In consequence of epidemics of plague, cerebro-spinal meningitis and small-pox, ten temporary appointments of Medical Officers were made, whilst the subordinate staff was increased by one Sanitary Inspector, two Assistant Surgeons transferred from the permanent staff, eight Sub-Assistant Surgeons obtained from India and one Engineer.

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* As regards this disease as it exists in the tropics, this fact is worthy of attention in the investigation promised in the Madras Presidency.

Against malaria quinine prophylaxis was pursued at the jail, Health Offices and Civil Hospital, and at out stations where the King's African Rifles and Police are stationed. Anti-mosquito gangs were employed at Mombasa, Nairobi and Kisumu. Dr. R. SMALL is reported to have taken special interest in the question of roof guttering affording shelter for mosquitoes. At Nairobi, the defective state of drainage is held responsible for the free breeding of anopheles. In the Hospital at Nairobi 31 Europeans were treated for malaria, with one death. The important statement is made that consequent upon conditions at Nairobi "a large number of native labourers are infected on the way to and during their stay in Nairobi." The Medical Officer of Health, Kisumu, reported of Uganda Railway employees that, when the disease was prevalent, 30 per cent. of their number were on the sick list from malaria.

No hospital is mosquito proof and, excepting one room in one house, only nine houses in the whole of the Protectorate are mosquito proof.

Plague is reported to have been epidemic in the District of Mombasa and sporadic at Nairobi, Machakos, N'darugu, Kyambu and Dagoretti. Only 272 cases were, however, "certified by the personnel of the Medical Department." In these the mortality rate was 86·76 per cent. Special and useful Reports by Captain SKELTON, R.A.M.C., and Dr. L. LOWSLEY are attached as appendices to the Report of the Chief Sanitation Officer. The rat gangs employed in the townships at Nairobi, Mombasa and Kisumu caught 1,656, 2,882 and 10,183 rats, respectively—figures showing no relation to the human population of these places, but giving to the gang at Kisumu with only 6,582 inhabitants the palm for activity. Plague inoculation was pushed energetically, but is not supported by law.

On the subject of dysentery Dr. Radford ascribes spread to polluted water and the action of flies. The majority of cases are of the bacillary type.

The severity of the epidemic of cerebro-spinal meningitis has already been noticed in dealing with the Medical Section above. Dr. Radford not only corroborates the statement, but holds that its incidence was so overwhelming as to forbid any effort at suppression with the small staff at his disposal, except in the immediate vicinity of Nairobi. The Provinces were attacked in the following order:—Ukamba, Kenia, Naivasha, Seyidie, Nyanza, Tanaland. He makes the following important observation:—

> "The greatest virulence and highest death-rates occurred in the highlands in Ukamba, Kenia, Naivasha, and North Kavirondo; *i.e.*, at an elevation of between 3,500 to 7,000 feet; and while the coast belt remained practically untouched, it is of great interest to record the fact that the number of cases was greatest during the cold weather—viz., May, June, July and August—and case incidence gradually declined as the hot weather set in. This period also coincides with that of comparatively dry weather."

Sanitary measures against the epidemic seem to have consisted largely of the use of quarantine and segregation huts for patients and contacts.

A special plea is made for the preservation of the purity of the streams at Nairobi, by diversion of sewage to a farm and treatment of the effluent before discharge. The argument is enforced by reference to the enteric fever epidemic of 1911 at Nairobi which, he states, "was traced to an infected water-supply."

The remainder of the Report shows that the important subjects of town and house planning, inspection of laundries, bakeries, dairies and of trade generally are receiving careful attention, and that given time and sufficient staff the new Sanitation Division will render sound public health service to the Protectorate.

UNITED STATES ARMY (1913–14).*

This is the first Annual Report issued by Surgeon-General GORGAS. As might be expected at the hands of that famous sanitarian, there is from beginning to end of his dealing with what might otherwise be exceedingly dry statistics, a search for evidence of weakness in the application of systems of disease prevention, demonstration of their value when correctly adapted to conditions and, finally, exhortation to the authorities he advises as to both the humane and economic value of applied hygiene.

The experience gained by the American Army, as in the case of the British, is by no means confined to temperate climates. The Returns deal with American troops in Alaska, the Panama Canal Zone and China; and not only with coloured troops in America but with native troops in Porto Rico and the Philippines. It is characteristic of the sanitary experience of Surgeon-General Gorgas, gained largely on the Panama Canal where economy and effectiveness of paid labour were the aim and outcome of his efforts, that at no point of his discussion of figures does he fail to impress his readers with the importance of the rate of "non-effectiveness," which is the equivalent of the heading in British Official Returns, "constantly sick." He is able to show a steady decline of this rate under all causes from 41·19 per mille in 1908 to 22·94 in 1913.

Surgeon-General Gorgas, in the interests of reduction of non-effectiveness, seems determined to do his utmost to secure full attention to the disability caused by venereal diseases. For several years efforts to educate the American soldiers as to prophylaxis have been made. In 1911, the non-effective rate from this cause was 8·82. In 1912, a War Department Order was issued directing a "compulsory system of venereal prophylaxis and physical inspection," aided by the stopping the pay of those disabled on account of sickness due to alcoholism, drug addiction, and other misconduct (venereal diseases)." The result has been that by 1913 the rate declined to 3·58 per mille.

The connection between intemperance and venereal diseases in respect to neglect of personal prophylaxis (provided for by the issue of special packets) is probably, the writer suggests, the chief factor concerned in the decrease, but Gorgas would leave as little to chance as possible, and where a return to barracks from the site of infection involves delay he advises as follows:—

> "The chief surgeon of the Eastern Department has noted in his annual report, soldiers do not seem to be willing to purchase the packets. Many exchanges report few, if any, sales, and apparently either the K packet

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* UNITED STATES ARMY.—Report of the Surgeon-General of the U.S. Army for the Fiscal Year ending 30th June, 1914.

must be distributed without charge to the soldier, or passes should be restricted to such time as would bring back those likely to be exposed to infection before the time had elapsed during which prophylaxis is effective."

In the Philippines the venereal admission rate exceeds that of the United States, and this sanitarian does not hesitate to insist that military officers who are responsible for the effectiveness of their men should not be held blameless. He states :—

> ". . . . Several posts have continued to develop a higher rate rather than a lower one, and it is believed that the time has come when the commanding officers should be held accountable for excessive prevalence of venereal diseases in their commands. They certainly would be so held for excessive alcoholism or any other drug addiction, and it is believed that the 'military instinct' should perceive as readily the value of maintaining a high state of physical efficiency through a low venereal rate as of keeping the 'powder dry.' "

In forwarding the Report to the Secretary of War, Surgeon-General Gorgas thus finally urges the importance of diminishing the venereal non-effectiveness rate :—

> "The economy to the Government effected by these recent measures is worthy of note. At the rate prevalent in 1909 when this propaganda against venereal disease was beginning to take its present form, the expectation for the number of days lost in 1913 in the Army by sickness through venereal diseases would be 391,000, the number actually lost in 1913 was 137,882; an apparent saving of 253,118 days resulted for the year. The time saved was available for military training and other duty. The monetary value was approximately $190,000, and under the former conditions this sum actually would have been paid out by the Government. At date of writing it is probable that one-and-a-half million men are under arms in the armies of the Allies in France. Applying the same rates to those armies, it would mean a saving of 4,200,000 days in a year, or the equivalent of an army of 420,000 for 10 days. The value of the services of men thus saved to duty is apparent."

In a recent "Sanitation Number" of this *Bulletin* (No. 7 of April, 1914 page 362) the facts concerning the period when anti-typhoid inoculation was voluntary in the American Army, as compared with the period of compulsion (1911), were detailed. The satisfactory result then stated was well maintained in 1913. In that year the troops were scattered along the Mexican border and in Texas in camps.

> "Amongst these troops not a single case of typhoid fever has occurred in an inoculated man since June 4th (1912). One case of typhoid occurred then in July and one in October, 1912, but in neither case had the prophylactic been administered. For the American Army, including native troops, at a strength of 81,697 the total admissions for typhoid in 1913 were only four, affording a rate per mille of ·004. Three of these cases occurred in America. Two of these cases were in recently enlisted recruits who were admitted to the hospital with the disease, one on the fourth and the other on other on the sixth day of service. The latter case had not received the first dose of the typhoid prophylactic when admitted to the hospital. In both cases the disease was obviously contracted prior to enlistment. In the third case the prophylaxis was employed for more than a year previous to the attack, but the soldier stated that he had received only *one* injection. One case occurred amongst the American troops in China. This patient had been inoculated in 1911. No other case occurred either amongst the American or native troops at home or abroad. All the patients recovered.'

In the Philippines, amongst American troops, the malaria admission rate has decreased from 167·79 in 1907 to 112·08 in 1914. The decline of dysentery is not so complete, the admission rate, 20·83, being higher than in 1910 (19·39). The rate for tuberculosis was 6·70 per 1,000. The mental alienation rate for American troops was 4·83 against the United States rate of 2·92 per mille; a result which, the writer thinks, would seem to support the argument advanced in this *Bulletin* (No. 4, August, 1914, p. 220) that this factor can hardly be of no import in judging the influence of tropical conditions on the white man.

DISEASE PREVENTION.

MALARIA.

Impounded Water and Malaria.

Senior Surgeon H. R. CARTER, U.S.A. Army, has recorded* the results ot a very thorough examination into the influence ot water impounded (for power purposes) upon the breeding of anophelines. The matter in certain parts of the United States is or vast financial importance, in respect to possible legal disabilities being imposed upon companies, should the health conditions of communities be threatened by malaria.

He was deputed to examine conditions caused by impounding the river Pee Dee at a suitable point (Blewett's Falls) for a dam. He found the structure an accomplished fact, and uses this as a text for urging that a sanitary survey of localities selected for impounding water should be held *before* execution ot the work is undertaken by engineers. Obviously, if the Sanitary Officer be provided with plans showing the proposed contour line of water, he would be able to indicate where work should be undertaken to limit its spread in certain directions. In the particular reservoirs examined, the dams were sufficiently high to produce a backwater of considerable depth for several miles, involving water spread over the catchment of numerous lateral supply streams.

This survey confirms the advantage of the old procedure of covering marsh land with deep water when it is not feasible to drain or fill it, in that the anophelines have but the choice of the margin of the mass of water for breeding purposes. It also proves that where the sides of the reservoir are steep wave action is inimical to larvae; that entangled masses of floating scraps of wood are liable to transport larvae from distant localities; that if these masses be hindered from being thrown upon dry shores by being caught in partly submerged bushes, mosquito breeding is favoured; that where the level of the impounded water alternately rises and falls within one or two feet, as a result of additions of fresh water and its exit (for example, for power production and its temporary cessation, with continued influx in the reservoir), "within a shorter time than the cycle of development of the mosquito," propagation is prevented. He notes the disadvantage of shelter by bushes in shallow water, grass, weeds and algae.

His observations on shelter afforded for mosquito breeding by bushes obstructing small floating material give support to the remarks of Dr. KENNAN, Senior Sanitary Officer, under the head of "River overflow swamp," in the Annual Report of the Medical Department of Sierra Leone for 1913 (p. 80). That officer states:—

> "After the rains commence and when they become continuous and torrential, many of the large rivers overflow their banks, and, by their rise in level, cease to allow the free passage of drainage from low lying areas beyond their banks. . . . . . Most usually the depression in the

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* United States Public Health Service, Public Health Report of December 25th, 1914, and January 1st, 1915.

bank which in the dry season allows exit for the stream draining the low-lying area to the river, is a narrow one compared to the area drained. When the water level rises in the river, the low-lying area becomes a lake from the combined effect of overflow from the river and retardation of drainage. Of course, it is not beyond the power of engineering science to deal satisfactorily with such situations, but in the Protectorate of Sierra Leone such schemes are not feasible. As was pointed out in a previous Annual Report such low-lying areas, where desirable on account of their proximity to towns, should be thoroughly cleared of low bush, so that as the water rises the appearance of a lake with surface unbroken and with even edges is presented, except perhaps where the trunks of tall trees carry branches and foliage above it. The subject is reverted to because the measure is a very simple one for political administrators to encourage."

Influence of the Hydrostatic Pressure of Impounded Water on Mosquito Propagation.

Senior Surgeon CARTER, to whose work reference is made in the preceding note, was deputed to ascertain changes brought about by impounding of water in the river valley *above* the dam. He therefore makes but one casual reference to the area below the dam :—" Below the dam this territory was breeding Anopheles profusely over a wide extent of marshy flat used as a pasture. It was breeding much less above the pond." This illustrates a sequel of the impounding of water that is to be met with largely under conditions found in India. Whilst, under British rule, magnificent irrigation works have been formed by diverting water from rivers by canals over huge areas of country, important impounding reservoirs have been rarely built, if that of Periyar, in the South of India, be excluded*. But, under Indian rulers, the expedient of impounding surface waters by raising horse-shoe embankments, on sloping catchment areas or fed by short channels from streams, is frequent in certain parts of the country. The embankments are ordinarily of very great breadth and are devoid of impervious cores. The method of construction with the earth available on the spot was by dumping basket head-loads, and thus a good grade of solidification was secured when aided by the tramp of crowds of coolies. Silting gradually helped to make an approach to impermeability of the bottoms of such reservoirs ; but it is probable, irrespective of occasional defects in the embankment permitting leakage, that the bottoms are rarely uniformly impermeable. These reservoirs (locally known as " tanks ") are the normal features of minor irrigation works, especially in areas with gradients permitting the surface water overflow of one tank to pass to the next lower down. Indian villagers do not ordinarily construct their villages on the catchment above an irrigation tank, but below it, so that they may utilise the discharge channels and be near their fields.

Under the latter typical circumstances, as the tank above a village fills, the immediate neighbourhood below it becomes water-logged as a result of hydrostatic pressure, and in sympathy with the

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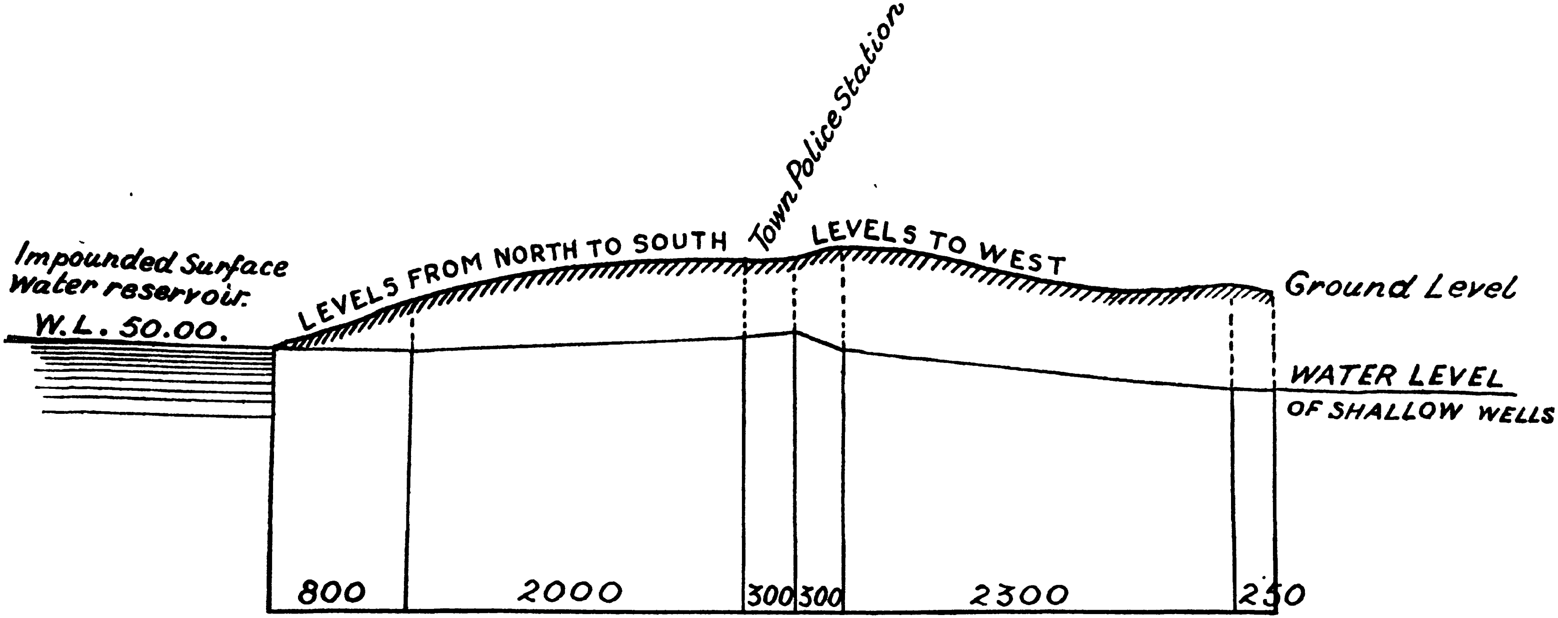
*At Lanavli, in the Bombay Presidency, there have recently been completed by Messrs. Tata and Sons, two impounding reservoirs capable of affording by a hydro-electric system more than 160,000 h.p. The Periyar lake, originally constructed for irrigation purposes in the Madras Presidency, is also capable of use for electric power.

Fig. A.



Scale : Horizontal $\frac{1}{10000}$
Vertical $\frac{1}{200}$

subsoil water the level of wells is raised. The result is the forming of marsh and (what perhaps especially aids the breeding of certain anophelines) small basin-like pools through which a gentle current of clean water flows. In short, a condition is liable to occur more or less corresponding to that described by Senior Surgeon CARTER below the dam of the water power work inspected by him. In that case, however, not only would leaks under hydrostatic pressure within the reservoir, but also the substream of the impounded river Pee Dee be factors concerned.

Provided the cutting is not placed in such proximity as to endanger the embankment under pressure from the contained water, an obviously possible remedy is the use of a subsoil drain either of loose-jointed pipes or loose rubble (Irish drains) placed between the tank and the village and at a sufficient depth effectively to lower the maximum sub-soil water level.

Should, however, the village be built on the upper side of the gradient and in a line with an impounded surface water reservoir, the effect may be that of obstructing the sub-soil water flowing towards its normal outlet, and thus cause inimical influence by direct raising of the sub-soil water within the village area ; this would occur ordinarily by causing the soil to approach a state of saturation by capillary attraction from the sub-soil water layer, thus readily allowing formation of pools on rain occurring, or by directly producing pools in depressions. An instance of such obstruction of subsoil water by a tank in the case of a malarious town in the Madras Presidency is shown in the accompanying sheet of levels (fig. A). In this case even when the tank is emptied of impounded surface water, the bottom extending over 600 acres, although possessed of a sharp slope, remains marshy under the influence of the subsoil water held up by the embankment of the reservoir on the lower portion of the gradient.

Water-Covering as an Anti-Malarial Measure.

This subject was referred to in this *Bulletin*, Vol. 4, p. 186 (Sanitation Number). Senior Surgeon CARTER's inspection of effects of water spread has been discussed in a preceding note. Lt.-Col. MASON (Medical Corps, U.S. Army) makes the following observations on the same subject (*Report of the Department of Health, Panama Canal*, April, 1914, p. 36) :—

> "The banks of that part of Miraflores Lake adjacent to Pedro Miguel are being cut at an angle of three-fourths on 1, from the 55·5 feet level to that of 53 feet, in the hope that a depth of water and an amount of wave action sufficient to prevent mosquito breeding may be obtained, and much labour and material at present expended on treatment of the lake with oil and larvicide thus be saved."

It is evident that the old ruling that the sides of a drinking water reservoir shall be cut so as to give a depth and slope sufficient to prevent the growth and decay of vegetation incidental to alternate rise and fall of the contained water, is also applicable, in a modified degree, to all ponds for whatever purpose employed, in the interest of prevention of mosquito breeding.

Anophelines and Subsoil Water.

A high subsoil water in a locality implies the possibility of oozing and forming of pools in depressions below the general ground level and, owing to saturated condition of soil by capillary attraction, a ready formation of pools at ground level on the occurrence of rainfall. Dr. Bentley in Bombay (preceded in Madras in 1900 by Lt.-Col. Cornwall I.M.S.) showed the importance of wells within inhabited areas in facilitating the propagation of anophelines. Dr. Allan, Acting Medical Officer of Health, Freetown, now proves that in Sierra Leone the varying depth of wells greatly modifies their suitability for this purpose. The writer would suggest that a fair deduction from this work is that a new way is disclosed in which subsoil water by its fluctuation may influence seasonal malaria. The important observations of Dr. Allan[*] (which must have involved much labour) included a study of locally found mosquitoes, but are here only referred to in regard to conclusions in respect to depth from the ground level of well surface water. He states :—

> "The method of examination adopted was by means of a net, consisting of a barrel hoop of 2 feet diameter covered with two layers of book muslin. This was lowered down to the bottom of the well and then pulled rapidly up. The larvae were examined for by washing the net in a large basin of water. . . . . . The number of wells examined was 418, and in 22·5 per cent. of these larvae were found. Of these *Culicales* were found in 75 per cent. and *Anophelinae* in 34 [? 24] per cent. Species of both *Anophelinae* and *Culicales* were found in some wells. Of the *Anophelinae* bred out and examined, *Anopheles costalis* was the species in every case. Of the *Culicales*, *Culex decens* was the most common species found. *Culex tigripes* was found in a few wells and in one *Culex insignia* was found. (All the above were diagnosed in the Imperial Bureau of Entomology). Stegomyia was also found."

Culices were found in wells with water rather dirty, and the surface at ten feet below ground level. But anophelines seemed to prefer wells whose surface level was not so deep and where weeds, moss, etc., were evident. When the subsoil water was so high as to afford a surface level of 5 ft. from the ground 57·7 per cent. of the larvae infected wells held anophelines, but where the level fell to an average of 24·5 ft. below the ground the proportion of anopheline-infected wells was only 15 per cent. Stegomyia (the species being *fasciata* "in every case") were found in wells with surface levels at various depths, and seem to prefer those where there were old and disused covers, pieces of wood, &c., floating on the surface of the water. Dr. Allan states that this examination must not be considered concluded, as there were at the close of the year still 250 wells to be examined.

Roof Guttering.

Dr. R. Small, Medical Officer of Health, Mombasa,[†] directs special attention to roof guttering as "one of the main breeding places [of mosquitoes] in that town." In the Annual Medical Report for 1913 (Southern Nigeria), Dr. R. Laurie, Acting Senior Sanitary Officer, states that "great attention has been paid to eaves, gutters, for even though they are punctured in sagging places, it not infrequently happens that the holes are stopped up with putty or wood, or they become blocked with dirt from the roof, and a special gang of men has been found useful in keeping the gutters cleaned and the punctures open. When possible gutters have been removed as it has been found, on several occasions, that even though a tank is mosquito-proof larvae have been found in the water." Surgeon-General GORGAS* also inveighs against roof gutterings :—" Comparatively recently it has been discovered [in the case of Fort Washington, Md.] that mosquitoes were breeding in the catch basins and wells, and also in eave troughs that did not completely discharge all rain water reaching them."

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[*] Sierra Leone.—Report of the Medical Department, 1913, p. 69.

[†] East Africa Protectorate.—Annual Medical Report. 1913, p. 37.

Difficulty in dealing with roof guttering is therefore not confined to Africa. Hence, the writer suggests that where mosquito-borne diseases exist, its use should be so limited by legal rulings as to make its construction possible only under clearly proved conditions of necessity. Dr. Laurie's description of arrangements at Mombasa show that when malarial efforts are hampered by attention to roof gutters a *reductio ad absurdum* may be reached ; on the one hand, by the object of the house owner to provide for a complete flow of rainwater from the roof in a preconceived direction being frustrated by holes made by public officials in his gutters and, on the other hand, by public funds being spent for the keeping open of these holes.

Under the circumstances, it is worth while considering as to whether at times roof guttering is not maintained in the absence of real necessity. As to protection of exterior walls of dwellings, it is certain that in countries where monsoons may shed their torrents for weeks on end (e.g. Lower Burma) they can be dispensed with. To meet this condition, houses should be provided with pent roofs at sharp angles. In designing roofs, " valleys " should be avoided, and the eaves should be prolonged† outwards and downwards so as to carry the rain clear of the walls without the aid of gutters, even if this implies that the water flow may be over the roof of verandahs. Right round houses so constructed should be an apron of concrete or other impervious material, within which should be a drain leading in the required direction. In this manner, the apron would be a continuation of the concrete filling of the basement and would form a protection not only against damp and subsoil air but against rats.

In some places roof guttering is intended for the collection of rainwater for drinking purposes, and is hence regarded as essential. Whilst acknowledging that localities exist where this cannot be avoided, the writer suggests that these may be diminished in number by careful search for other sources of water supply ; and that there is no merit in using gutters, tanks, barrels, rainwater separators, screening, etc., plus staffs to supervise them. If roofs must be so used, in at least the case of houses within their own compounds, less care is required to keep the rainwater drains round a house clean

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*** UNITED STATES ARMY.—Report of the Surgeon-General, 1914, p. 64.**

† At p. xiv of the illustrations appended to the Sierra Leone Annual Medical Report for 1911, a bungalow is shown with the eaves thus extended. At p. 29 of the Gold Coast Medical and Sanitary Report for 1913, it is stated experiments are being made with "storm boards"; so far results are said to be satisfactory.

to enable the water to reach underground reservoirs, than if the roofs had gutters, especially as the periodicity of rains in the tropics allows timely preparation. Beyond the fact that a roof presents the advantage of a ready made impervious surface for collection, it has no virtue; and it might well be that were the prime cost to householders of roof gutters and their various attachments and maintenance taken into account a good case, financially, could be made out for communal rainwater supplies derived from areas rendered artificially impervious, in those rare cases where no other source of supply than rain water is feasible.

Agriculture and Malaria.

The agriculturist requires for the assimilation of manures by plant life that the soil voids shall not be constantly filled with water—the soil must have aeration. Hence, irrespective of control of surface water (so that the soil may not be robbed of its plant food by velocity of flow), he demands that water-logging shall not occur, and consequently is a strong advocate of subsoil drainage. Sanitary interests in agriculture are, therefore, not only concerned in food production and in the return to mother earth of that which was derived from her, but in treatment of soils by drainage; for here the sanitarian and agriculturist can unite in defeating the deadly enemy of labour—malaria. This is no new discovery. The fact that by surface and sub-soil drainage—one or both—malaria could be exterminated was fully recognised many years before Ross showed that the connection between water, soil and malaria was the propagation not of a germ, but of mosquito larvae. When this fact was established, there should naturally have ensued an increase of radical measures to abolish malaria—the chief of which is drainage. Instead of which the pointing by Ross to minor anti-malarial measures for destruction of larvae as also applicable cheaply, whilst he in no way deprecated the importance of drainage, was held by some civil authorities controlling the purse strings as a reason for ignoring drainage and its attendant expenses.

Many years elapsed before Ross in respect to the Phœnix barracks, GORGAS at Panama, and Malcolm WATSON at Port Swettenham showed by drainage works the importance of radical as contrasted with palliative measures. The latter authority especially has made a point recently of proving the economic importance to the agriculturist of such works. Much of this attitude of opposition to "drainage" is also perhaps due to the fact that to laymen the term implies the use of expensive material and expert engineers, such as they have been accustomed to see employed within municipal towns. The difficulty is added to by the fact that engineers, of a class capable of making abstruse calculations for the construction of bridges and great irrigation works, are apt to regard subsoil drainage of large areas as a petty matter which concerns agriculturists, and hence is a subject to which they have given little thought.* The matter becomes, however, much less formidable to the average lay official if the sanitarian confines his terms to "relief of surface and subsoil waters," and refers in a particular case to the various means by which that end can be secured without confining himself to the financially dreaded word "drainage."

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*Dr. LAURIE, Acting Senior Sanitary Officer, Southern Nigeria, in his Report for 1913 (p. 42) states under the heading Subsoil Drainage:—"This important subject has hitherto received little attention from the engineers of Southern Nigeria.

It is well recognised that to the relief of subsoil and surface water in the course of improved agriculture and land reclamation the present immunity of Great Britain from malarial fever is due. But it is apt to be forgotten, when referring to anti-malarial work of the present day, that 50 years back the French by large works in Algiers favoured agriculture and largely stayed malaria.

In 1867, the British Government appointed a Commission composed of Dr. SUTHERLAND, J. POYNDER, D.I.G. of Hospitals, and Lt.-Col. C. B. EWART, R.E., to report on the result of these anti-malarial works upon the health of the French Army. The following typical extracts from this old Report* should aid sanitary officers in dispelling doubts of local authorities as to the efficacy of dealing both with surface and subsoil waters by permanent works:—

Draining of Marsh Land.—Lake Halloula (15,000 hectares of land) was drained at a cost of about 5s. 5½d. per acre. The main drainage canal was 5½ miles long with numerous subsidiary channels. "The effect on the neighbourhood has been decisive. The villages which formerly suffered severely from remittent fevers, often taking the form of pernicious fevers, are now healthy and they have been freed of mosquitoes which during a part of the year made life almost intolerable." The Commission was therefore within a measurable distance of anticipating the connection between malaria and mosquitoes, but lost the opportunity!

Agriculture without Drainage.—The Commission considered that Foudouk was improved but not freed of malaria by simple agriculture—not accompanied by drainage.

Extra-mural Works.—It is noted that Bona had originally deep rich alluvial soil saturated with water. "It was determined to drain the plain by means of large deep main drains similar to those executed in marshy districts at home, and by forming a system of surface drains over the area led into the main outfall. Market gardening and agriculture [were conducted] over surface."

Intra-mural Works.—"Subsoil pipe drains were placed at depths varying from 3 feet 6 inches to 6 feet 7 inches, according to depth required to secure the necessary fall. They were laid in lines in the public streets. The practical result of the work has been that whereas formerly the water level was at above the surface of the ground, it is now 20 inches or more below the level of the surface. . . . A good water supply accompanied the drainage works." The mortality of the population, which in 1843–1846 was 57 per mille, was reduced in 1865 to 18 or 20 per mille. "Pneumonic fevers are said to have disappeared since the works were executed, and other milder types of fever are of rare occurrence." The Commission finally remarked:—"The first thing that struck us on entering the town was the healthy aspect of the people, especially the children, and some we saw would have been a credit to the healthiest spots in England so far as appearance went."

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*Parliamentary Paper No. 19,447. Report on the Causes of the Reduced Mortality in the French Army serving in Algeria. Published in 1867.

Agriculture the Ally of Sanitation.—To the conclusion of the Report the writer would especially invite attention :—

> "The whole evidence goes to show how much the general health of all countries is dependent on the condition of their agriculture, that in warm climates this is really a fundamental consideration, and that in all countries the health of the people and their progress in material improvement are indissolubly connected with each other. It is in this way that agriculture becomes in reality as essential a part of Sanitary Administration for improving the health of the country population as drain. ge, water supply, cleansing and general town improvement are part of tne public hygiene of towns."

At no point would the sanitarian and agriculturist find larger ground for co-operation in the tropics than in respect to management of "wet crops," more especially of rice. It has long been recognised by the sanitarian that it is not the act of irrigation which has to be dreaded, but the fact that the agriculturist, in spite of a few laws—neglected usually in the financial interests of water owners—persists in using more water than is really requisite for his crops and allowing the surplus to flow whither it lists. When then Mr. HARRISON, of the Madras Government Agricultural Department, makes a statement founded not upon theory but upon "a series of carefully designed experiments" during several years to the effect that "drainage, or at least some movement of the soil water, is essential for paddy cultivation, and especially so when bulky organic manures are applied," there becomes evident the possibility of a new era in the protection of populations from malaria.* From the agricultural point of view also Mr. HARRISON's work is regarded as of great value, as Mr. D. T. CHADWICK, I.C.S., the Director of Agriculture, states that a control experiment at Manganallur, which corroborated Mr. HARRISON's views, and that officer's "work are two of the most important and instructive local agricultural events of the year." His important memoir on the aeration of paddy and on the intimate relation of green manuring and drainage was also completed.

The Bombay Government defines the precautions necessary from an agricultural point of view in pursuing wet cultivation under the Gokak Canal, as follows :—"The three essentials are that the fields should be levelled, that water-logging should be prevented by proper drainage, and that water channels should be kept water-tight, as straight as possible and free from weeds." Obviously, these precautionary measures might as well have been written for prevention of malaria. Agriculture on scientific principles is likely to become an important ally of sanitation in tropical countries in the near future.

Dry Zones in Malaria.

The Sanitary Commissioner with the Government of Madras in his Annual Report for 1913 (p. 8) is able to record a reduction in fever mortality in the Municipal Town of Cuddapah from 4·5 to 2·1 per mille, a result which he ascribes to "prohibition of wet cultivation in and around the town and to the anti-malarial measures undertaken during the year at the instance of Major T. S. Ross." As wet cultivation prohibition was enforced in this town in 1904, and as the death rate is now 35 per month against 47 of 1893 (to which allusion is made

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*** Report on the operations of the Agricultural Department, Madras, 1913.**

in a note under Vital Statistics in the present number), the dry zone doubtless has not been without influence; although it is obvious that there existed plenty of room for the carrying out of modern anti-malarial methods. In the presence of a system of wet cultivation when drainage and regulation of waste are absent, should malaria exhibit itself, it is probable, so far as the important question of flight of mosquitoes has been worked out (this *Bulletin*, Vol. 4, p. 448), that. whilst dry zones of a small radius will afford much protection, the mile required by DEMPSTER was a very fair approximate estimate for safety. The great point in fixing dry zones is that the periphery shall at all points be the defined distance from the outermost dwellings of the place to be protected. The tendency is for public authorities to be satisfied by ruling prohibition within their own areas of administration, regardless of irregularities of demarcation of their limits in respect to neighbouring authorities, and to forget that to profit by this course drainage must still be zealously cared for within the so-called dry zone.

In 1881, the writer persuaded the Municipality of Kurnool (Madras Presidency) to enforce a zone of a mile radius. Irrespective of absence of knowledge in pre-Ross days as to the connection between mosquitoes and malaria, and consequent failure to take appropriate action, the zone was surreptitiously infringed from time to time. Nevertheless, even under these unfavourable circumstances the method proved of distinct value. The registered death rate from "fevers" per cent. of all causes declined as follows :—

1879–1883	64 per cent.
1884–1888	49·5 „
1889–1893	54 „
1894–1898	43 „
1899–1903	46 „
1904–1908	36 „
1904*	19 „

It may be added that within the zone dry and garden crops were encouraged in place of rice cultivation, but no suggestion for control of channels for such crops or of drainage was accepted by the local authority, in the face of vested interests. After 1904, the dry zone was retained within the municipal limits, and as these did not conform so fully to requirements it is unnecessary to trace the results.

Fish Farming and Larvicides.

The Agricultural Department of the Madras Presidency does not limit its operations to land. It has branches dealing practically with the economic aspects of fish culture, both in fresh and salt waters. Incidentally it has undertaken, on behalf of the local authorities, experiments determining the value of certain fish as larvicides and the maintaining of stocks of these. Mr. H. C. WILSON, the Piscicultural Expert to the Government of Madras, at the 2nd All India Sanitary Conference, read a paper on the subject in which, as a result of very carefully conducted experiments guarded by controls, he was able to furnish definite and valuable opinions. He expressed the belief that having found a genus of fish that would readily devour mosquito larvae the choice should rest with that species which is more rapid in its movements, and by its colour would be the least liable to detection; for he sees no reason to doubt, from careful observation, that the mosquito, more especially when laying her eggs or disengaging from the pupa state, has an instinctive watchfulness. He comes to the following conclusion:—

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*In 1904 the Chief Civil Officer of the District required better observance of the zone.

> "1. Genus—*Chela* (all species are useful, but the smaller ones are the best.)
>
> "Geographical distribution of genus according to DAY:—Sind, Continent of India and Burma, including Malay Archipelago.
>
> "Class of waters where these species would be of greatest service: tanks, swamps and village ponds.
>
> "The members of this genus are not good travellers, but if taken n properly constructed carriers can travel considerable distances safely.
>
> "2. Genus—*Haplochilus*—DAY gives four species. Geographical distribution of the genus, India, Malay Archipelago and beyond, tropical Africa, Islands in the Indian Ocean, also temperate and tropical America.
>
> "Best suited for stocking wells, channels, stagnant pools, and any mosquito-infested waters at long distances from the breeding grounds.
>
> "These fish are exceedingly good travellers and if properly prepared for a journey (conditioned) and not overcrowded, can be kept in the same water for days together, the water requiring very little aeration.
>
> "3. Genus—*Therapon.* Species, *Therapon jarbua.* Geographical distribution of the species (DAY): From the Red Sea and East Coast of Africa through the seas and estuaries of India to Malay Archipelago and north coast of Australia. These are suitable to stock backwaters, salt and brackish swamps and pools near the coast. These fish can also be used in fresh water ponds.
>
> "They travel fairly well if care is taken."

Fish Larvicides or "Filling."

The following extract from the Report on the operations of the Department of Agriculture, Madras, 1913, tends to prove that a judicious choice of fish for stocking ponds may result in saving much expenditure in filling. Mr. H. C. WILSON says:—

> "I was asked to advise the Madras Corporation on the best means of dealing with mosquito larvae in the numerous tanks in and around Madras; for this purpose I made an inspection together with the President and the Medical Officer. On my advice the tanks which otherwise would have had to be filled in are being kept clear of weed and stocked with larvicides. Up to the present time the President reports that it is working most satisfactorily and practically no larvae can be found where the instructions have been carried out."

The writer would add that the stocking of ponds with larvae-eating fish has been long practised in the Canary Islands (Teneriffe) as a preventive of mosquito breeding in the interests of domestic comfort.

Drinking Water and Malarial Fever.

Much writing occurred in the past over the question of the supposed conveyance of malarial fever by drinking water. In the opinion of the uneducated Indian, the *fons et origo mali* is water. Mr. WILSON, the Pisciculturist expert referred to in the preceding note, affords an opinion as to the usefulness of frogs as larvicides and, at the same time, suggests the origin of the supposed connection between drinking water and fever :—

> "The 'bad' well may contain murrel (Ophiocephalia), a natural enemy of the frog, which would keep it clear of frogs and small fish. The presence of frogs in the 'good' well shows there are no murrel, and it is highly probable that some small larvae-eating fish will be there also. The mosquitoes would naturally favour the so-called 'bad' well, as it is the safest breeding ground, and multiply rapidly. It would be reasonable to suppose that a number of these will become infected with malaria germs by biting visitors to the well and so spread it. The fever is then put down to drinking the water of this well."

The writer believes that many of the "step wells" of Indian villages of ancient origin (so made that the drawer of water descends by steps to the water level) have shaded recesses where mosquitoes perhaps rest in comfort during the hours of sunshine.

Malaria Gamete Bearers not always Infective.

In the course of experiments as to identification of anophelines as true malaria bearers, the following important result was arrived at :—"These experiments also called attention to the fact repeatedly observed in the laboratory that not every gamete bearer is infective during the entire period in which gametes are present in his peripheral blood." (*Report of the Department of Health, Panama Canal,* 1914, September, p. 8.)

YELLOW FEVER.

Screening or Larvicides.

Asst. Surgeon CONVERSE, U.S. Public Health Service,* undertook to convert the town of Iquitos, Peru, a notorious hotbed for yellow fever, into a reasonably healthy locality. The old bogey of "want of funds" at disposal of local authorities, familiar to sanitarians in all parts of the world, defeated the radical scheme contemplated in consultation with an engineer, after it had been duly elaborated. Makeshift methods were therefore resorted to.

The town of 12,754 inhabitants, mostly Indians, is described as possessed of no sewers but, in lieu, it had 18 kilometers of open drains—"a succession of mosquito breeding pools. There is no public water supply. Its streets were unpaved; many of them are boggy and marshy; some are covered with a rank growth 3–4 feet high, others with both water and vegetation. It has no hospital or public clinic." The average death rate for the decade preceding 1913 was 40·58 per mille; but, in 1912, the rate was 49·52 per mille. Altogether, therefore, Asst. Surgeon Converse had, in the absence of funds, no light task before him.

Under the euphemism of "vomito-negro," a disease supposed to be peculiar to the locality, he recognised that yellow fever was endemic. Screening and fumigation of houses was out of the question, owing to the cost locally of material. He, therefore, was confronted with the alternative of adopting a compaign having for its "one object the location and destruction of the breeding places of the Stegomyia.".. The various steps of the campaign have been—employment and training of native inspectors; the passage of the necessary Ordinance; obtaining the necessary larvicidal material; clearing up, screening, destruction of larvae; educating the people." The larvicide was of the same character as used in Panama but, pending arrival of this, kerosene oil was employed. Presumably under the ordinance referred to, "the burden of clearing up and screening water containers was placed entirely on landlords and tenants."

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* United States Public Health Report. 1914. Vol. 29. No. 46.

Mosquito nets were used for yellow fever patients in the infected blocks, and every container of water was kerosined. There were no secondary cases—"although the first day and night of illness were passed without any screening whatsoever." For the rest, Asst. Surgeon Converse shows that his work was one of persistent action against the larvae of the Stegomyia and, as he puts it, consisted of the "usual thousands of inspections, screenings, abatement of nuisances, cartloads of tins etc. removed, being the same as in all work of this character."

The result of this work has been a splendid illustration of the great utility of anti-larval and other minor sanitary measures, in staying yellow fever and general mortality, and is thus modestly stated by Asst. Surgeon Converse:—

> "The net results of these routine operations and general clear up are that, although in previous years yellow fever had never failed to be present in epidemic form at some time of the year, there has not been one case of the disease since February, 1913 (18 months), and the general mortality rate dropped from 49·52 in 1912 to 22·88 in 1913. That this diminution in mortality was not produced by a reduction in population was shown by census and also by birth rate, which rose from 59 in 1912 to 64 in 1913."

Portable mosquito-proof Rooms.

During 1913, an epidemic of yellow fever occurred in Lagos. Its advent was prepared for by causing the European ward and several native wards "to be adequately mosquito proofed." In addition, the excellent precaution was taken of having ready mosquito-proof portable rooms 9′ × 10′ × 8′. It is reported that "these rooms can be set up in half an hour and proved extremely useful."

PLAGUE.

Transport of Rats.

The following are extracts from the East Africa Protectorate Annual Medical Report (p. 41 and 74) for 1913:—

> "One fact is pre-eminently established—that plague is following the trade routes, and that the Uganda Railway with its fleet of lake steamers is a direct agent, not only of introducing the disease by means of infected cargoes brought from places outside the Protectorate, but also of transmitting it from Kisumu to other lake ports.....Instances have occurred where plague infected rats have been found in cotton and hides brought from the lake ports into Kisumu, and again after fumigation of the ship at that port, officers and crew have succumbed to the disease a day or so

subsequent to the departure of the ship from Kisumu.....Where these infected rats came from has not, so far as I know, been discovered. It may be presumed that the original rat may have come down by train in merchandise from Kisumu or Nairobi. I am informed that rats have actually been seen to emerge from grain vans on the railway.....There has been no recurrence of plague in any disinfected house since the arrival of the Clayton machine."

The fact that before the use of sulphur fumigation cases recurred in houses is of utility, more especially as it is supported by the statement that in houses Claytonized, in which guinea-pigs were subsequently placed, none died of plague. The experiment however, would have been more exact if, before disinfection, it had been proved that infection of guinea-pigs was possible.

Mummified Plague Rats.

These are frequently found during plague operations, but their ability to be harmful is naturally doubted in view of the assumed desertion of the flea, and death of the plague microbes in the presence of saprophytic organisms. In the following case,* the connection with living plague bacilli is complicated by the fact that the rat was within an enclosed space, and that the faecal matter of the flea (living, say, 12 to 20 days after the last infected meal) may have been in contact with the remains of unknown date which were "ground up" for testing. It is, at any rate, noteworthy that after the time required to mummify a rat, there were living fleas of which one (a *Pule cheopis*) "showed bipolar staining organisms that were identical with those of plague":—

"Mr. William Crozier, the Editor of the *Manila Daily Bulletin* who had his office in the Stewart Building, was taken violently ill....his case was definitely diagnosed as one of plague.....The diagnosis was completely confirmed by laboratory methods. While carrying out the insecticidal and other antiplague measures in his office, a mummified rat was found in a drawer of his desk. There were also in the drawer a number of live fleas, one of which was captured and identified at the Bureau of Science as the rat flea (*Pulex cheopis*). Stained specimens from this flea showed bipolar staining organisms that were identical with those of plague. The mummified rat or large mouse which was found in his desk was taken to the Bureau of Science, ground up, and inoculations made from it into healthy laboratory rats produced typical cases of plague in them."

Vital Statistics of Rats.

Estimates varying with the country have been made, during plague operations, as to the number of rats in relation to the human population of towns, but to arrive at a normal death-rate of rats would add to their value. The Bureau of Public Health, Philippine Islands (Report July to Dec. 1913, p. 34) thus treats the subject:—

"There is at least one rat per inhabitant, but, in order to err on the safe side, let it be supposed that there is only one rat for every two inhabitants. The average life of a rat is said to be approximately five years. In round numbers, the population of Manila and its environs is about 300,000 persons. On the foregoing basis, there would be a natural mortality of 150,000 rats for each five-year period, 30,000 rats per year, 2,500 per month, or an average daily mortality of 82 rats."

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* Philippine Islands Bureau of Health Report. July to Dec. 1913. p. 102.

The Flea and Fly Count.

The Report of the Department of Health of the Panama Canal for September (1914, p. 7) details the following method of making a flea count:—

> "The method of combing rats for fleas—particularly plague-infected rat fleas—presents certain disadvantages which have been obviated by the following method:—From several tests it was found that fleas began to leave a killed rat as early as fifteen seconds after death, and all had left the body a little more than two hours and fifteen minutes afterwards. We therefore killed the rat by cephalotripsy, and immediately placed the body on a glass rod grating over a collection of water in a very large glass jar or the inverted cover of a garbage can; either one will answer the purpose. The fleas soon began to leave the rat's body and drop into the water, and may be conveniently collected by means of a medicine dropper. We have obtained higher counts in this way than by chloroforming and combing or by any other method."

At page 12 of the same Report, it is stated that one quart of flies represents 13,000.

Stable flies as Plague Carriers.

G. W. McCoy and C. W. Chapin* showed that a "plague-like" disease prevailed amongst rodents—particularly squirrels—due to *Bacterium tularense* and could be contracted by man. In the human being there occurred "conjunctivitis with cervical adenitis and considerable systemic disturbance." The disease is readily transmitted to rodents without shaving the skin, by such small traumatism as may be caused by holding the skin with forceps, or rubbing the conjunctiva with a grain of sterile sand under the eyelids. Death results in five or six days in the guinea-pig. When an animal suffering from bacteraemia during this disease is bitten by stable flies (*Stomoxys calcitrans*) they are capable of transmitting it to an unaffected animal, if it be bitten within one hour. If the house fly (*Musca domestica*) be allowed to pass over the viscera of an animal dead of this disease, and be transferred to the conjunctiva of an uninfected animal, the full symptoms of the disease and death follow.

Assistant-Surgeon Wayson now supplements McCoy's observations by showing that *Stomoxys calcitrans* can convey not only the "plague-like disease," but "plague" proper, if allowed to bite an animal suffering from bacteraemia in that disease. He states that the minimum number of bites necessary has not been determined but that "in two experiments when flies were allowed to bite an infected animal eight times death resulted. . . . . Further information is also desirable regarding the transmission of plague by the stable fly, since this fly will feed on carcases recently dead. Definite information might explain the occurrence of cases of this disease which do not lend themselves readily to an epidemiological explanation by flea transmission."

Cyanide Fumigation.

At the 3rd All India Sanitary Conference, Major Glen Liston, C.I.E., I.M.S., detailed a series of elaborate experiments which had been undertaken by him, aided by Captain Stevenson, I.M.S. and

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*United States Public Health Bulletin, No. 43 of 1911, and 53 of 1914.

Captain TAYLOR, I.M.S., concerning the action of hydrocyanic acid gas as a disinfectant, with special reference to the killing of rats and fleas.

Whilst the danger of this gas to human life is admitted, it is held that with reasonable precaution its use should be safe. The light character of the gas, and the extent of its penetrative powers in the disinfection of grain (as to which the superiority of sulphur dioxide is acknowledged, offer difficulties which have to be overcome. They established that grain subjected to exposure to the gas is not rendered poisonous nor incapable of germination. To enable the presence of gas to be detected (irrespective of its characteristic odour), they prepared a " paste by mixing in a dry mortar caustic soda and ferrous sulphate. This is applied to a glass rod and the rod is exposed to the gas for a definite period. A few drops of hydrochloric acid are then added to the paste on the rod, and the rod is stirred up in some water in a test tube. The development of a prussian blue colour gives a rough idea of the concentration of the hydrocyanic acid gas if the paste is exposed for a constant period."

To overcome the difficulty caused by the light character of the gas, they contrived an ingenious machine. This consists of an iron drum-shaped reservoir termed the mixing chamber. This is served with the gas from a reservoir (the "generating chamber") formed of a glass bell jar surrounded by a water seal, and resting on a leaden cup-shaped base. There is communication by pipe between the generating and mixing chambers.

The gas is generated by " mixing together solutions of potassium cyanide and sulphuric acid of 50 per cent. strength. The two solutions were placed in two large separator funnels which led through a rubber bung at the top of the bell-jar ; by means of stop cocks, the two solutions were allowed to flow at any desired rates into the lead vessels below. When the two solutions mixed hydrocyanic acid gas was rapidly evolved. The rate of production of the gas could be delicately regulated by the stop-cocks, and by observing the evolution of the gas through the gas bell-jar. We were able thus, at the beginning of fumigation to produce large quantities of gas by running in the two solutions rapidly into the leaden vessel, and later, by running the two solutions less rapidly, we could keep up the concentration of the gas in the room which was being disinfected."

In the side of the mixing chamber, there are inserted india rubber tubes, one communicating with the space to be disinfected (in which all openings are closed, as usual when employing gaseous disinfectants), the other with a fan, so that air charged with the hydrocyanic gas may be withdrawn and again forced into the space. They summarise their results as follows* :—

" (1) Hydrocyanic acid gas is an effective disinfectant for plague, not because it has any direct action on plague bacilli, but because it kills rats and fleas. The fact that rats do not generally live in grain bags, but in the spaces between them and that fleas do not bury themselves in grain to a greater depth than the gas can penetrate ensures that they are readily accessible to the action of the gas.

" (2) The gas can easily be generated, distributed and diffused through rooms, godowns, and the holds of ships by the apparatus we have devised.

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*Proc. 3rd All-India Sanitary Conference held at Lucknow Jan. 19–27, 1914. Vol. 5. Papers. (Suppl. to the Indian Jl. Med. Research), p. 167.

"(3) Owing to its characteristic odour and to the existence of a simple and delicate chemical test for its presence, this very poisonous gas can be used with safety by persons who exercise a moderate amount of caution.

"(4) This gas does not injure the most delicate fabrics or metals and does not render food unfit for consumption; grain will germinate after exposure to the gas.

"(5) No light or heat is required for the production of the gas, so that the danger of fire or explosion is non-existent.

"(6) The cost of chemicals for generating the gas is small; twelve thousand cubic feet can be treated for about three rupees and four annas.

"(7) The generating apparatus we have used is fairly portable. A single machine would suffice for the disinfection of an ordinary Indian dwelling, but a battery of five or six machines would be required for the disinfection of a large ship or godown.

"(8) The gas being slightly lighter than air can be easily removed from rooms, holds, etc., by ordinary ventilation.

"(9) The quantity of gas required for efficient disinfection will depend on the air-tightness of the room to be treated, the time the gas is allowed to act, the thoroughness of the distribution and diffusion of the gas, as well as on the cubic capacity of room and whether it is full or empty.

"(10) In general we have found that from ½ to ¾ of an ounce of Potassium cyanide per 100 cubic feet of space to be treated should be used. The gas should be allowed to act for about four hours. In small rooms which can be fairly tightly closed half an ounce of Potassium cyanide per 100 cubic feet will suffice and the period of exposure can be reduced to one hour. If larger spaces are treated, such as godowns and holds, especially if these are full of merchandise, ¾ of an ounce of Potassium cyanidewill be required and the gas should be allowed to act for four hours."

This subject has also been receiving attention at New Orleans, U.S.A., by Passed-Assistant Surgeon Norman ROBERTS.[*] The danger of using this gas is recognised, but it is held that it can be guarded against by "vigilance on the part of the fumigator and the ship's officers." He employs two methods—the "crock" and the "barrel." In both cases, for each 100 cubic feet of space he uses one fluid ounce of commercial sulphuric acid to three ounces of water; to which, subsequently, as directed, is added one ounce of potassium cyanide.

The "crock" is a cheap glazed cylindrical stoneware vessel of about a gallon capacity. It may be used for spaces under 5,000 cubic feet, provided the fumigator is able to make a rapid exit. It is therefore unsuitable for holds of vessels. The sulphuric acid, having been mixed with the water (preferably whilst still hot), is placed in position, in the space closed except for purpose of exit of the fumigator, who drops the proportion of solid cyanide into the one or more "crocks"—and bolts.

In the barrel method, which is suitable for holds of ships, any large barrel will do, but it is advised that it is "advantageous to char the inside of the barrel and line it with a small quantity of paraffin wax driven as deeply as possible into the wood by heat; but untreated barrels, originally in good condition, appear to last for several fumigations without marked deterioration if not subjected to the action of unduly strong acid, as by mixing the acid and water in the barrels without sufficient stirring. A 50 gallon barrel will serve for the decomposition of about 80 pounds of cyanide (125,000 cubic feet of space), but it is better to use much smaller charges (20 to 30 pounds—30,000 to 45,000 cubic feet of space) and more barrels, on account both of the difficulty of handling barrels full of a troublesome liquid, and of the faulty distribution of the gas when given off from a single source into a large hold complicated by cargo barricades and decks." The method pursued is as follows :—

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[*] United States Public Health Reports, 1914. Dec. 11. No. 50.

> "Fumigation is carried out by diluting the acid with part of the water in the barrel, which is then swung down to the lowest accessible point in the hold ; the cyanide, previously dissolved in the remainder of the water, is then poured into the barrel from the deck by means of a pitcher and funnel through a long rubber hose. After the cyanide is all in, it is followed after a few seconds or minutes by a strong sodium carbonate solution, which expels part of the dissolved hydrocyanic acid from the waste and reduces the remaining acidity, thus economizing on the expensive cyanide and rendering the waste less poisonous, corrosive, and troublesome."

Remarks.—Both the Bombay and New Orleans experiments will doubtless secure greater use of the cyanide method, but there will naturally arise demand for further research on certain of the points raised. Both realise that information is requisite as to securing correct distribution of the light gas, and as to its penetrating powers. Assistant-Surgeon ROBERTS gets rid of the latter detail, at once, by asserting that, "For use against plague, it has the great advantage that it penetrates most articles of cargo without damaging, killing the vermin *no matter how deeply hidden.*"* But he fails to support this statement by any experiments *ad hoc;* and leaves it unproved that, when he increases the density of the gas, by what is apparently a mere mechanical mixture of carbon dioxide with the hydrocyanic acid gas, a differentiation does not rapidly occur by the heavy gas passing to a lower level, followed by very slow general diffusion of both. The Bombay experiments attempt to get over the diffusion question by using nine distribution pipes, but give no idea of the fan power requisite to secure equable results, complicated as this must be by resistance from friction offered by multiplication of tubes. Judging by a handle attached to the fan, manual power is intended to be used. Nor, whilst a circulation of the contained air and gas to and from the mixing chamber is arranged for, is it shown what position within the space under disinfection is advised for the withdrawal pipe, although it is evident from the illustration of the machine which accompanies the paper, the light gas is introduced by the distribution tubes at the bottom of the door of the room and that the withdrawal tube is at the top, which theoretically would hardly be suitable. Again, experiments have been conducted in spaces up to 12,000 cubic feet, but as a barge with two holds of 600 was employed, the chances are that the *vertical* depth was small ; yet in treating the holds of sea-going vessels, the depth must be of importance, in relation to the possibility of the light gas failing in killing power at the bottom. These matters are chiefly mechanical and should present no difficulty, but are of importance if the method is to be largely utilised.

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*Italics not in the original.

As to penetrative power, the Bombay experiments have approached the subject with care. Although the fact that a rat was found in a bag of grain sent to Chitral, seemed at one time to threaten a dis proportionate view of the importance of grain traffic by certain members of the Plague Investigation Committee, they now assume from actual experiments that the rat as well as its flea is content with living external to bags of grain, and "that the fleas did not penetrate far enough to avoid the lethal effects of the gas in loose layers of grain." The experiments on this latter point whilst clear as to the limits of penetrative power of the gas in rice (between one and two inches) are vague as to how the limits of voluntary efforts of fleas were determined.

In contrasting the effects of hydrocyanic gas with sulphur dioxide as a microbe as well as an insect killer, the Bombay record attempts to disarm criticism, by asserting that the microbe killing virtue of the latter gas is negligible in plague, and refers to the experiments by the Plague Investigation Committee with plague contaminated floors showing them to be innocuous by mere exposure within twenty-four hours; but fails to point out that at periods within this time, according to the nature of the floor, they are not innocuous.

The writer, whilst agreeing with the opinion that rats do not burrow into bags of grain (although they may arrive there by accident in loading) and that in the presence of commencing decomposition the plague microbe disappears in the body of the rat, suggests that possibly exceptional mummified rats and certainly their fleas within bales of merchandise (see a preceding note) or bags of grain cannot be regarded as harmless, nor disinfectants as fully effective, if their penetrative power be doubtful.

Whilst, therefore, cyanide fumigation has been advanced by the Bombay and New Orleans experiments in scientific and practical value, it is undesirable, without more evidence than shown by either, to accept passed Assistant-Surgeon ROBERT's dictum as to the penetrative powers of the gas, if contrast be made with sulphur dioxide. Thus HALDANE and WADE* in describing destruction of typhoid bacilli in the presence of 0·5 per cent. of sulphur dioxide show that the following were the conditions :—

> "Before the cultures could be affected in the above experiments the gas had to penetrate many layers of material, viz., several thicknesses of blanket and wrapping paper, a mass of cotton wadding, several thicknesses of tissue paper and finally the tightly packed cotton-wool plugs of the culture tubes. The conditions are as drastic as any that would be likely to occur in practice. As a still more stringent test, two packages made up in the same way were placed in a steel trunk loosely filled with clothes. One of the packages was buried among the clothes, and the other was placed on the top of them covered by a blanket. The trunk was then locked, so that the only means of access of the gas was through the space between the body and its somewhat badly fitting lid."

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*Local Government Board.—Report of the Medical Officer, 1903, p. 330.

CHOLERA.

The Human Carrier.

Under Sanitary Rulings, it is shown how the importance of the human carrier has been guarded against in the Philippines. The *Report of the Bureau of Health for the Philippine Islands*, for 1913, advances the hypothesis that the cholera vibrio may be present in human carriers, yet not cause an epidemic outbreak until by successive passages through the intestines its virulency is exalted. The action of various insects as carriers of the microbe to food is being studied systematically.

In India, Major GREIG, I.M.S., has insisted upon the importance of the human carrier, and has shown that the biliary passages of men afford excellent shelter for the cholera microbe. In a more recent research, he has shown that there is no evidence to support the view that the "endemic prevalence depends on the vitality of the cholera vibrio outside man" (*Proc.* 3*rd All-India Sanitary Conference, held at Lucknow, Jan.* 19 *to* 27, 1914. *Vol.* 4. *Papers.* Supplement to *Indian Jl. Med. Research.* p. 99).

Cholera and River Surface Water.

Water obtained from substreams of rivers, collected by infiltration galleries or wells, offers many advantages in regions in the tropics where the surface flow in the river beds departs with the rainy season. When public supply water works thus depend on infiltration water, during the rainy season the surface water at a site above the works for a town may be suspected of conveying cholera.

The River Cauvery, in the Madras Presidency, certainly seems capable of conveying cholera to towns and villages on its banks. Thus, in a carefully compiled statistical enquiry, the writer came to the conclusion that it is possible this river conveys infective matter without destruction for a distance of eighteen miles, and that on a tributary, the Bhavani, for every ten villages within five miles of either bank of this river 1·34 were affected against 0·24 in every ten beyond that distance.

It is conceivable that either by an extension of the drainage cone, by leakage in the works, or a fault in the sub-stream formation, an infiltration gallery or well might be supplied with a certain amount of surface water.

The infiltration wells of the Trichinopoly water works, South India, gave trouble from floods and other causes, so that. at intervals, for some years it was necessary to supply the town by pumping surface instead of infiltration water from the Cauvery. The following data apparently show that a substream water is a safer source of supply than a river surface water, it neither are to receive special treatment before delivery. The data lack the control experience of delivery of surface and river water to inhabitants of different areas, at the same time. There is also no verification that the particular inhabitants infected did drink either one or the other water. There is, however, sufficient evidence to give weight to this opinion:—

Years.	Jan.		Feb.		Mar.		Apr.		Oct.		Nov.		Dec.	
	S.	I.	S.	I.	S.	I.	S.	I.	S.	I.	S.	I.	S.	I.
1898 ..	a 161		321		8		d 60			—		1		82
1899 ..	b 273		79		14		e 1			—		—		—
1900 ..		3		33		5		—		—		25	h 143	
1901 ..	44		69		c 15			—	g —		65		112	
1902 ..	41		14		2		f —			2		2		—

REMARKS.—*a*=From 27th to 31st.; *d*=Up to 23rd; *b*=8th to 31st; *e*=Up to 14th; *h*=From 10th to 31st; *c*=Up to 24th; *g*=No supply from 9th to 27th and surface water from 27th to 31st; *f*=Up to 3rd.

NOTE.—Where not specified the period was for the whole month.

— = No cholera when the water specified was in use.

S=River surface water. I=Infiltration water.

The figures represent cases of cholera.

TYPHOID FEVER.

The extension of typhoid fever amongst natives in some of our Colonies is a matter that deserves, and is attracting amongst the officers concerned, close attention, with the object of preventive measures being taken before the disease makes itself more apparent. In Sierra Leone, some indications of spread are noted in the Annual Report of the Medical Department for 1913 (pp. 15 and 75). Dr. COLLETT states: "The existence of enteric amongst natives has also been observed." Dr. KENNAN refers to three cases among officers at Mount Aureol, supposed to have origin in the eating of mangrove oysters from Aberdeen Creek, and also the case of a native soldier at the Wilberforce Barracks. He describes local conditions of water-supply and night soil conservancy which favour typhoid spread, and finally states: "There may be undetermined factors which counterbalance these considerations, but such a possibility cannot justify relaxation of efforts in prevention." No enquiry seems to have been made as to possible sources of contamination of the oysters. It would be of interest to know whether the tidal waters were contaminated.

"Salgas," placed along the banks of a river, as found at times in Africa, may not be without danger. A case of typhoid at Panama is reported "apparently due to the use of water seeping from a bank honeycombed with privy pots." (*Report of the Department of Health, Panama Canal, 1914.* Sept. p. 6).

Anti-Typhoid Inoculation.

The Report of the Surgeon-General of the U.S.A. Army (by Surgeon-General GORGAS) shows the results of anti-typhoid inoculation. This was commenced in 1909 as a voluntary measure, and was made compulsory in 1911. Gorgas states: "It is quite interesting to note that among all the troops scattered along the Mexican border, and in the large camps in Texas not a single case of typhoid fever has occurred in an inoculated man since June 4th, 1912." No case occurred amongst the troops in the Philippines in 1913. The admission rates for the whole Army were in 1911 0·85, in 1912 0·31, in 1913 0·44, whilst the death-rates were respectively 0·09, 0·044 and nil.

SMALL-POX.

Small-pox in India.

In his Annual Sanitary Report for 1913 (p. 7) the Sanitary Commissioner with the Government of Madras states that the small-pox death rate in municipalities, where vaccination is compulsory in an aggregate population of 2,605,074, is 0·3 per mille, against 0·4 per mille in rural areas where vaccination is practised, but with few exceptions is not compulsory. In both cases vaccination is not practised in infants below six months of age, except in municipalities if exposure to infection is proved. As ceremonies in honour of the goddess presiding over small-pox (to which mothers bring their infants) are largely attended, exposure of the young to infection is considerable. As the inhabitants outside municipal areas number 40,173,578 in a decade, the loss of over 40,000 lives is the penalty for "conscientious objectors."

The Sanitary Commissioner, Behar and Orissa, shows in his Annual Vaccination Report for 1913 (p. 2) that in the Gaya District, where vaccination has been insufficiently accepted by the people, owing to the employment of an undesirable class of vaccinators, the small-pox mortality rate is ·62 per mille: whereas in the Tirhoot District, where such difficulty is not experienced and increase of vaccine operations is reported, the rate is ·12 per mille.

Preliminary Disinfection in Vaccination.

On this subject Lt.-Col. HARRISS, I.M.S., Sanitary Commissioner, United Provinces, India, states (*Triennial Report on Vaccination in the Provinces of Agra and Oudh,* 1913):—

> "The use of the tincture of iodine in vaccination as recommended by Major E. E. WATERS, I.M.S., late Civil Surgeon, Hooghly, was tried on 188 children vaccinated in the Lucknow District. The District Superintendent of Vaccination reported that none of these operations was successful, although the same lymph without the preliminary application of iodine to the arms produced successful results."

Verification of Vaccination Results.

The 1,154 vaccinators of the Province of Behar and Orissa in 1913 reported a success rate of primary vaccination of 99·66 per cent., in 1,283,999 primary cases. This average skill in this number of vaccinators, certain of whom are termed by the Sanitary Commissioner as "particularly dirty and incompetent" is, in the phraseology of Dominie Sampson, "prodigious." Although in the Behar Circle the Deputy Sanitary Commissioner inspected 4·25, District Inspectors 30·27, and Sub-Inspectors 50·46 per cent. of the total cases and the rate of success as found by them was 94·48 and by the Inspectors 97·59 per cent., the corrections do not seem to have made much impression on the total figure for the Province.

In Assam, during 1913–14, 336,649 "primary and secondary operations" were performed with a success rate, according to vaccinators, of 98·47, according to the inspecting staff of 92·83, and according to Civil Surgeons 97·07. In the Punjab, the vaccinators reported on 671,994 cases a success rate of 97·40 per cent., the Civil Surgeon 96·45, whilst the officers of the Sanitary Department found the rate in various areas to be 79·58, 84·37, 89·9 and 91·7 per cent. In Bombay, although the Deputy Sanitary Commissioners travelled in the aggregate, during 1913–14, 8,451 miles for the purposes of inspection, the results of their verification of the total Presidency rate of 99·18 is not recorded.

Whilst much of this difference of opinion is due to the employment of an undesirable class of vaccinators, it is probable that this might diminish if official returns provided for a differentiation between primary and secondary operations. If a vaccinator is allowed to return all cases that are not re-vaccination as primary or group them as "primary and secondary," there is nothing to prevent 1,145 vaccinators operating with such consistent skill as to obtain in spite of deductions by inspections by superior officers 99·66 per cent. of success.

CORY and MURPHY,* who were in charge of the first animal vaccine depôt in London under the Local Government Board, certainly were entitled to be regarded as expert vaccinators. They personally used lymph direct from the calf in 5,591 cases. Their rate of success in "first trials" on primary cases was 99·55 per cent.; so that the Bihar and Orissa vaccinators beat them by points.

Cultivation of Animal Vaccine.

Some day it is hoped the above title may imply a laboratory process. In the meantime, an animal must be the medium. At p. 437 of Vol. 4 of this *Bulletin*, the writer has referred to the importance with which the maintenance of a "strain" of vaccine must be regarded, by those in charge of large vaccine institutes amid the difficulties which tropical conditions present. This subject received special care at the hands of Major PATTON, I.M.S.,† Assistant Director, King Institute of Preventive Medicine, Madras, and Captain F. W. CRAGG, I.M.S. in charge of the Vaccine Section of that Institute, during 1913–14. The Director, Lieut.-Col. F. MAITLAND GIBSON, summarises results secured as follows :—

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*Local Government Board.—Medical Officer's Report 1886, No. 4. Appendix A, No. 1.

†MADRAS PRESIDENCY.—Annual Report on Vaccination and on the Work of the Vaccine Section of the King Institute of Preventive Medicine 1913–1914.

> "Attention is drawn in this Appendix to certain improvements f procedure notable among which are :—
>
> "(1) The selection of lymph for seed purposes from a large number of animals vaccinated in the ordinary way. This is entirely in accordance with the practice at the Government Lymph Establishment, at Hendon, London, and has quite superseded the vaccination of special stock animals.
>
> "(2) The three-line method of insertion. This certainly does seem a better procedure for the class of animal and the climate we have to deal with.
>
> "(3) If the reputed improvement in stock lymph when kept in the form of unground and immunised pulp is maintained, a further notable advance will have been made in our technique."

The belief that continuous transmission of vaccine through calves results in attenuation, which is referred to by Major Patton in the opening of his Report, is largely held. It is one, however, that must be accepted with certain reservations when this experience is gained under the adverse meteorological conditions peculiar to a tropical climate. It has always seemed to the writer that if it be the case that bovines afford inimical soil it remains to be proved, and in practice it is negligible, but that in the meantime it is very evident that the adverse conditions to which from generation to generation vaccine production is exposed in a tropical climate must, if not correctly met, ultimately cause degeneration from type; just as surely as in agriculture oats may, by careless treatment, become useless for food purposes. The stock dealt with by Major Patton* is descended from the variola vaccine obtained by the writer in 1891, and although its purity subsequent to 1902–03 was doubtful, up to that time it had been maintained from calf to calf by his former assistant, Dr. PALPU (late Deputy Sanitary Commissioner, Mysore) *in vigour and unmixed with other stocks.*

Acting upon experience gained in an endeavour to improve the stock current before 1891 in the Madras Presidency, the writer was convinced that rejuvenation was feasible for brief periods only by means of retro-vaccine and asino-vaccine.† The buffalo, donkey and goat were also tried as new soils. The first two gave fairly good, but temporary results. On obtaining the variola-vaccine stock, however, it was so vigorous that rejuvenation was thenceforth unnecessary; and, seeing that former efforts had secured a mere increase of vigour in formerly current vaccine, it was directed that on no account should this newly gained stock be mingled with any other for any purpose. Indubitably, the stock required no rejuvenation when passed solely through calves for nineteen years, when treated by the writer's system.

In the writer's preliminary experiments inoculation by punctures few and many, free scarifications in patches, lines of different lengths oblique and longitudinal, single, double and treble, and in groups of small lengths forming square patches on the abdomen, as well as thighs and thorax, were all duly tried. The conclusion arrived at was that whilst by certain of these modes the yield of vesicle pulp could be increased, to put the not very vigorous typical calf of Southern India to any strain in the effort to secure quantity by extensive inoculation was inimical to quality; that the most perfect vesicles were produced by subjecting the skin to the least traumatic disturbance feasible—so much so that it was found the employment of a sharp or blunt knife, and the evenness with which the true skin was penetrated by different assistants, represented vast differences in yield; that a silky soft white skin of the abdomen of a vigorous animal gave the best results; that the character of vesiculation within limits varied in different calves, and that by selecting special animals for cultivation of seed lymph. and retaining them under special hygienic and food conditions, the chances were always in favour of close adherence to type on transfer to average calves for vesicle pulp purposes; that in this way, various strains* of lymph could be maintained, and by following rules (first stated by WARLOMENT) vesiculation could be retarded or hastened in development; that where the tendency was not to conform to type (in spite of efforts in cultivation by early or late removal of seed lymph) strains should be abandoned; that to secure such selection of strains, it is necessary to maintain full records of each on each calf inoculated, and that the staff employed should inspect the animals inoculated at hours ordered by the officer responsible, and be prepared to remove the vesicles at the time indicated by him after personal inspection for each calf; even if, as may happen in some of the total inoculated, this were necessary at undesirable hours of night or day. There was of course nothing in such rules which prevented selection of a strain from a calf intended for vesicle pulp (as now practised by the Local Government Board officers and advised by Major PATTON) if it appeared on maturation that an improvement upon a strain had occurred; but in making this selection, the advantage was possessed of a full knowledge of the behaviour hitherto of the particular strain. All this meant a vast deal of trouble at the hands of an efficient and willing staff, but it implied a command over cultivation such as no other method can afford.

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* Proc. South India Branch Brit. Med. Assoc. Apr. 1891.

† Indian Medical Gazette, 1914, May, p. 206.

When, therefore, Major Patton throws over all power of discrimination of strains and trusts to selection of vesicles from, say, twenty animals, his staff is saved a vast deal of trouble; he has power of selection from a stock instead of from several strains, but runs the risk of a breakdown, such as is not incurred by the more careful method. If the writer's system had, as he believes was the case, gradually fallen into disuse without benefit to the stock, necessarily, the only way open to Major PATTON was the pooling of all strains and selection therefrom.

If the pooling method be adopted, it is well to remember that it is always possible for an undesirable change in the vaccine of a whole series of calves inoculated at the same time to occur which, *whilst evident in the mass, may not be so in selected vesicles, and yet this will surely evince itself in some generations whilst missing others.* This can only be averted by knowing the history of the behaviour of each strain from calf to calf.

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* The term "stock" is used in this note to distinguish the various sources of origin of vaccines; whereas the term "strain" is used to distinguish the lineal descendants from a particular stock.

Major PATTON's claim that by using triple lines for inoculation he secures a better result than from single lines may be quite correct as to quantity of pulp, but need not be true as to quality of vaccine.

As to rejuvenation, for which that officer suggests donkeys be used, the writer believes that whilst by change of soil such as transfer from the calf to the rabbit, the donkey, the horse or buffalo—which possibly acts by getting rid of extraneous micro-organisms which had threatened to become all powerful on the calf—some temporary improvement may occur, true rejuvenation can only be obtained by variolation of the calf, and the facilitating of vesicle production by subsequent implantation of vaccine.

Finally, Major PATTON makes an announcement of a new method of treating vaccine pulp before using it for seed transfer, which is an original observation likely to be of great utility He thus describes the method :—

> "Latterly the technique of using the seed lymph has been further improved. If it is not to be used immediately it is without any further treatment placed in a sterile Petri dish and stored in the cold room. When required it is pulped and mixed either with glycerine or with sterile saline solution, and then used for vaccinating the calves. Five hundred and eighty-one calves were vaccinated in this way during the months of February and March, 1914, and 5,413 grammes were collected from them, each calf yielding on an average of 9.31 grammes. All the vesicles were well formed and typical; the lymph produced normal vesicles on children vaccinated at Saidapet."

The method of temporarily storing vaccine vesicles in a refrigerator during the rush of work until the staff was able to attend to the process of pulping and preservation, is not new at the Institute concerned, but the interval before the preservation process was purposely made as short as possible. Evidently, therefore, Major PATTON must have ascertained that favourable changes occur on a definite lapse of time. His further evidence on the matter should be of great interest, and may greatly modify present methods both in temperate climates and in the tropics.

Yield of Vaccine Pulp in Buffalo Calves.

According to a Report from the United Provinces of Agra and Oudh* the average yield per cow calf of vesicle pulp was 29 grammes, and of buffalo calves 48 grammes. If these amounts of vesicles be collected in an absolutely cleanly condition and free of all scabs they are so large compared with what seems possible in the South of India (as stated in the preceding note) that the breeds at disposal in the United Provinces must be of very sturdy characteristics. Rejuvenation is attended to by the use of rabbits. The vaccine is issued in the glycerinized form. From April to September (hot weather) in 764,699 primary operations the reported success rate was 81·5, but during the cold weather, October to March, this rose to 94·8 per cent.

BERIBERI.

The Chemistry of Rice Polishings.

In a recent *Bulletin* (Vol. 4, No. 4, page 209, Sanitation Number), the views of Dr. CHEVALLIER and Dr. John R. GIMLETTE on the influence of mouldy rice in beriberi were discussed. Both suggested from a review of epidemics of this disease, in widely different circumstances, that the influence of moulds in destroying the phosphorous constituents of the pericarp was as likely a factor as the polishing of rice, and both urged protection of rice from conditions under which moulds were favoured. Dr. GIMLETTE formulated this view by stating that "hygiene when applied to the imported food supplies of labourers . . . . may be of greater benefit than legislation." This method of regarding the subject is strengthened by the assumed delicacy of the active principles in the rice pericarp. Thus, after alluding to various efforts to effect isolation, an Editorial Note in the *Lancet* (January 23rd, 1913, p. 193), states: "From this it would appear that the so-called vitamine is a readily decomposed base, and it would be interesting to discover what happens to its nitrogen in the processes of nutrition. Usually inert, nitrogen may in a nascent state prove to be an activator." Obviously also, factors other than the artificial effects of polishing should undergo study. Those who have seen great mounds of loose paddy awaiting in rain transport by railways congested with traffic, will appreciate the fact that changes may occur in the pericarp before polishing can have affected it.

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*UNITED PROVINCES OF AGRA AND OUDH. Triennial Report on Vaccination. 1911-12, 1912-13, and 1913-14.

Diet and Beriberi.

The following is an extract from the East Africa Protectorate Annual Medical Report for 1913 (p. 22):—

> "Dr. PUGH points out that it is not improbable that this disease is more prevalent in a mild form than is generally imagined. Twenty-eight cases were admitted from a planter's *shamba* at Voi towards the end of the year; 19 of these improved, 1 died, and the remaining 8 were still under treatment. Here, again, the patients were all up-country folk. An interesting fact was that their diet scale did not include rice, being almost wholly mealie meal."

In the Sierra Leone Medical Report for 1912, it was stated that in the gaol there were 32 cases of beriberi with 4 deaths, and that 20 cases remained in hospital at the end of the year. It was stated that "uncured" (husked) native rice was employed. In the Report for 1913, (p. 20), Dr. W. A. YOUNG, Medical Officer, Prisons, reports that during the year "seventeen more became infected and six deaths resulted."

PELLAGRA.

Dr. Alex KING, Medical Officer, 2nd District, Saint Lucia, gives the following opinion as to causation of pellagra *:—

> "Cases of Pellagra cropped up from time to time, and it seems that this disease is becoming more prevalent. The incidence of pellagra does not fit in with the Simulium theory, and I believe that Dr. SAMBON has abandoned it. Nor does it with the damaged maize theory; in fact, in only one of the cases which have come under my notice was there any history of continuous consumption of corn meal; and, even then, there was no reason to suppose that the meal was in any way inferior or damaged."

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* SAINT LUCIA.—Annual Report of the Medical Officer. 1913–14, p. 5.

After alluding to the work of Surgeon GOLDBERGER (U.S. Army), on the subject of dieting in this disease, he states :—

> "It is certain that the class amongst which the disease occurs here subsist on a very monotonous diet, and that fresh meat is usually replaced by salt-fish. The hypothesis would also supply a reason for the occurrence of cases in gaol among those inmates who practically spend their lives there, as the gaol diet (though calculated to conform as closely as possible to standard diet) is certainly monotonous and does not contain a superabundance of fresh food."

SCURVY.

In a recent number of this *Bulletin* (Vol. 4, No. 8, page 447) will be found an allusion to the influence of cooking upon the anti-scorbutic powers of cabbage. The "Board for the Study of Tropical Diseases" of the United States Service (p. 125, Report of the Surgeon-General U.S. Army for 1914) state that their experiments with guinea-pigs (which are peculiarly susceptible to scurvy) "showed that canned cabbage was quite an efficient preventative and that boiling for one hour does not decrease the efficiency, as observed in guinea-pigs."

ANKYLOSTOMIASIS.

Examination of Subjects.

Assistant-Surgeon CONVERSE, U.S. Public Health Service, thus describes his method of conducting an anti-ankylostomiasis campaign :

> "It may be of assistance to others to describe the machinery adopted when but one physician is in charge. The prospective patient was received by an office boy, who handed him a number in the order of his arrival. He passed on to a clerk, who filled out the portion of a clinical card concerning name, age, etc. This card was given to the patient. In the order of his arrival he reached the treatment room and went to the microscope. We were fortunate in obtaining as one of our inspectors a young Peruvian, José Cardenas, who had spent two years in the medical department of the Georgetown University and who took over this portion of the work. With frequent verifications of his work and personal examinations of all doubtful cases, diarrheic stools, and such other as were deemed necessary, the system worked well. The patient brought a match box or a bottle containing faeces, and the microscopical findings were noted on the card ; the patient then passed to us for the clinical history, physical examination, and treatment."

In Sierra Leone, Dr. YOUNG states that 41 per cent. of the prisoners in the Freetown jail are infested with ankylostomiasis.

Chief Medical Officer G. W. A. LYNCH, states that during the year 1913, in Fiji, "the Indians introduced were found to suffer to a larger extent than usual from this disease, having arrived in the Colony with the disease well marked, and in some cases so severe that it was necessary to reject them altogether." Dr. P. T. HARPER, Acting District Medical Officer, Navua, Fiji, shows that the mortality per mille of indentured Indians decreased annually from 1910 to 1913, inclusive, as follows—96·6, 48·1, 50·3, 29·3 per mille. He ascribes this reduction as undoubtedly due to an extensive sanitary campaign against ankylostomiasis.

Dr. Norman L. **Leys**, in charge Kilindini Hospital, East Africa, states :—" I feel certain that not less than a fifth of the people on the Island [Mombasa] are infected, and that much ill health, often undiagnosed, and sometimes not believed in, except by the patient, is to be attributed to this cause."

THE FLY AND INFANTILE MORTALITY.

The " Delhi boil " is quite an old acquaintance, but is likely to be overshadowed by the fame of the Delhi fly. Major A. W. **Cook-Young**, I.M.S.,[*] Health Officer of the Municipality, has pursued a steady campaign against flies in a city where their presence in vast quantities has hitherto been notorious. Recognising fly-borne enteritis as a great factor in infantile mortality, he shows, coincident with a reduction in the multitude of flies, the following decreased incidence in infantile mortality per mille of births :—

Months.	1912.	1913.
August	363	333
September	409	242
October	444	222
November	415	185

A step in an anti-fly campaign of considerable importance has been undertaken in the District of Lautoka, Fiji, on the plantations by Dr. E. G. **Arnold**[†] ; he states :—

> " Separate fly-proof nurseries with concrete floors are in process of erection throughout the district and are completed and occupied on some estates. They constitute a great improvement on the old state of affairs and will probably do much to diminish the frequency of bowel disorders among the children."

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[*] Proc. of the 3rd All-India Sanitary Conference, held at Lucknow, Jan. 19–27, 1914. Vol. 2. (Suppl. to the Indian Jl. Med. Research). p. 146.

[†] Fiji. Annual Medical Report for 1913. p. 13.

SANITARY ORGANISATION.

THE ELIMINATION OF THE EPIDEMIC RATE.

In his Annual Report for 1913, Dr. A. D. MILNE, Principal Medical Officer, East Africa Protectorate, states:—"Were it possible to eliminate the disastrous effects of the epidemic diseases which so seriously affected the Protectorate during the year 1913, it could be said that a better standard of health was maintained than has been recorded." This has a family likeness to an interesting Government Review of the Report of the Sanitary Commissioner of the Punjab for 1912, in which it is stated:—

> "These figures seem to show that the Punjab in a favourable year is healthier than several European countries, though it still falls a long way behind the most advanced. One of the problems before the province is the elimination of the epidemic. It is that which is the disturbing factor in our death-rates, and which may send up a rate of 26 in one year with a bound to nearly 50 in the next. But there is much to be done too in the general amelioration of the sanitary conditions of life. Measures undertaken with this end in view will not only reduce the frequency and the virulence of epidemics, but will also bring the death-rate for a healthy year much below the present figure of 26."

Seeing that in 1911 it was found that, in the intercensal period, the population of the Punjab had suffered two million deaths from plague, the officer drafting the Review had in his memory sound cause for urging sanitary reform.

As Dr. Milne holds that one of the most important features of the year's history in the East Africa Protectorate is the reinstitution of the office of the Deputy Principal Medical Officer, which had been abolished in 1908, and the creation of a Sanitary Division, it is apparent that he would agree with the opinion as to the necessity for an organisation which shall be capable of effecting a "general amelioration of the sanitary conditions of life" as the foundation for true progress. Indeed, it can only be by the possession of sound sanitary organisation and efficient sanitary works that it will ever be possible to quote vital statistics of the tropics that may rival those of advanced European countries, by rendering the elimination of epidemics an accomplished fact.

FINANCE AND SANITARY WORKS.

The following extract from the "Review by the Government of Bengal of the Reports (1913) on the working of Municipalities of Bengal" exhibits a not infrequent trait in the treatment of finance by young public Bodies in the tropics:—

> "In several municipalities the balances exceed the ordinary income, the explanation in most cases being that the municipalities are accumulating funds with which to carry out large schemes of water supply and drainage."

The Resolution of that Government also on the Reports of Commissioners of Divisions on the working of District Boards shows the same tendency to accumulation of funds without, however, the added intention of devoting them to specific works :—

> "A still greater advance was made in the expansion of Union Committees and the consolidation of the Unions already in existence. Eleven of these bodies introduced taxation for local sanitation. These enhanced powers were accompanied by substantial increase in the income of District Boards, and thus conditions were unusually favourable to progress. But the result of the year's work is somewhat disappointing, for despite the increase in their receipts the expenditure by District Boards actually declined, and the closing balances rose to a sum nearly equal to half the annual ordinary expenditure. This failure of local bodies to make full use of their resources in spite of their enhanced powers and greater freedom from control, is the most striking feature of the year's work, and the reduction of the heavy balances is a problem which deserves their most careful attention. Medical relief and sanitation received rather more attention than before, *but the expenditure on sanitary measures is wholly inadequate to the needs of the Presidency.*"*

In advising public bodies to undertake sanitary schemes, there will usually be met, during verbal discussion, three powerful opponents. They are powerful because plausible, and it behoves the sanitary adviser to beware of them. There is the man who, on a scheme being explained, will, with an air of complete conviction, startle all concerned by declaring it will demand for its execution impossible thousands. For his defeat, it is well to have ready an "approximate estimate," or ask him to give his figures and reasons. Then there is the careful man, who will point out that funds at disposal will only permit of a small expenditure annually from amounts not already ear-marked, and therefore instead of undertaking the complete scheme a portion might be accomplished year by year. It is of course unnecessary to suggest that there may be schemes where this is feasible, but, as a rule, this course represents very poor policy. For example, whilst in effecting town improvements there may be sound reasons to support the treating of areas at different periods, it is usually altogether bad in respect to groups of public buildings; and the same may be said of its application to sewerage and water schemes. In regard to the two latter especially, errors in structure are likely to occur, as a result of constantly changing supervision, as well as actual waste of material. Nor are these the only obstructions to economical progress likely to be encountered. Officials are likely to succeed each other in bewildering succession, and the father of a scheme may have difficulty in recognising his offspring after it has been improved or mangled by various experts. In consequence, delay and often financial disaster result from dealing with schemes by halting execution.

But the most plausible opponent of hygienic advance is the man who asserts that a public body should not go into debt for sanitary works. He is ready with the ingenious argument that by putting aside each year a specified sum it will be possible after a certain period to undertake, without raising a loan, schemes of which the necessity is recognised. This policy will always find a number of supporters as it appeals to the innate dread of individuals, acquired in their private capacity, of "going into debt." This apparently accounts for the undesirable condition to which the Government of Bengal refers in the above extract; the Municipalities and District Boards referred to doubtless have flattered themselves that in the possession of large unspent balances, ear-marked for important sanitary schemes, they are worthy of special commendation. Yet their action—or rather, want of it—must have meant the depriving of tax-payers of the present generation of many useful sanitary advances that the future generation may benefit; instead of adopting the sound principle of arranging by loans to spread financial strain for large works over a series of years, so as to render both present and future tax-payers liable to payment for benefits received.

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* Italics not in the original.

A further method of false financial economy which young public bodies are liable to indulge in, is to starve the maintenance of completed works. Thus, the Bengal Government, in their Review, find it necessary to make the following remarks:—

> "In reporting on the anti-malarial operations in North Barrackpore, Major FRY has remarked that the drains constructed there already show signs of neglect and lack of maintenance. It is essential that municipalities should realise that if drainage schemes are to be effective it is imperative that proper attention should be given to the drains after completion, and that the practice of undue retrenchment in the recurring cost of maintenance can only result in the waste of the capital expenditure."

SELECTION OF LOCALITIES FOR RADICAL ANTI-MALARIAL WORKS.

A policy which has numerous adherents is—before proceeding to undertake anti-malarial measures to explore huge areas of the country concerned and compile year by year facts as to the bionomics of mosquitoes, aided by speculations as to the accuracy of the vital statistics of the inhabitants. The net result may be that it is discovered, here, the chief malaria-bearing mosquito haunts domestic wells or, there, prefers pools of brackish to fresh water at disposal in neighbouring marshes. It is then possible to say, had anti-malaria works been undertaken against the marshes, the mosquito inhabitants of the well or the brackish water would have held sway with financially disastrous results. The argument is correct within the limits of saying that anti-malarial works should be undertaken in a special locality only after an examination of *local* conditions, and a verification of the necessity for action. For the rest, the leading feature in selection of localities should be the degree to which, being proved malarious, they are on the lines of traffic of the country, or are important sources of labour supply, and are therefore a danger to the country in general. Such a decision would also influence the question as to how far malaria stricken populations can demand financial aid from funds of a central government. To deal with the chief malarious centres of this character should be the first aim of the sanitarian, just as much as he would desire to focus efforts upon the control of carriers of other diseases.

Public works are often so situated that to introduce in the midst of labour camps a few malaria-stricken coolies may bring about epidemic outbreaks involving financial interests of great importance, and extensions of malarial fever from fleeing coolies in new areas of country may occur before local control of mosquito propagation can be secured. An instance of danger of this nature is referred to by Dr. RADFORD, Senior Sanitary Officer, when in treating of malaria in Nairobi, East Africa, he states, in his Annual Report for 1913:—"A large number of native labourers are infected on their way to and during their stay in Nairobi." What interruption of labour by malaria may imply has a fresh illustration in the *Report of the Bureau of Public Health, Philippine Islands*, for 1913, where it is stated:—"It is estimated that malarial fever in the Philippine Islands is responsible for at least 25,000 deaths per annum. Another 100,000 are ill from this disease, and are unable to perform work for varying periods of time."

DWELLINGS AND MALARIA.

During 1913, American troops were sent to occupy a position in the Panama Canal Zone without due anti-malarial measures having been first undertaken. An undesirable amount of malarial fever followed. Thereupon, Surgeon-General GORGAS furnished this opinion to the U.S. War Department* :—

> "A commanding general should be as much shocked to find barracks at tropical posts unscreened as to find the buildings in the Dakotas unprovided with doors and windows, and quartermasters should as soon think of leaving a post in the tropics, which was to be occupied, without oil and larvicide as to leave a post in the Dakotas for the winter months without a supply of fuel."

Dr. KENNAN, Senior Sanitary Officer, Sierra Leone, in his Report for 1913, gives an opinion as to public quarters in the tropics which touches a subject often forgotten, even where screening or other anti-malarial measures for protection have not been neglected. In discussing the danger of providing inferior "rest houses" for officers on travelling duty in proximity to native dwellings, he states:—"The provision of better lodging arrangements for those travelling on duty should be complementary to the improvement in their housing at new head quarters."

CAMP HYGIENE.

Domestic filters, unless their capacity for duty is ensured by conscientious treatment are, so far as microbic diseases are concerned, liable to be a snare and delusion; and hence it is an axiom that water for the household in the tropics should be boiled. Unfortunately, so great is the popular trust in filters that frequently persons boil and then filter water, instead of vice versa. But, when boiling is employed careful treatment is essential; in the first place, to secure that not mere heating is practised and, secondly, that contamination after boiling does not occur when the water has been cooled. The fact that such water is in an excellent position to favour an excess growth of organisms if contaminated has long been recognised. The Report of the Bureau of Health, Philippine Islands, for 1913 (p. 16) contains interesting evidence on this subject.

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*UNITED STATES ARMY.—Report of the Surgeon-General. 1914. p. 81.

The Bureau had required that water given to persons in restaurants, refreshment rooms, etc., should be sterilized by boiling. Thereafter, private persons considered, in certain instances, that they had suffered by being supplied with water that had not been sterilised. Hence, the necessity for ascertaining the extent of microbe increase in boiled water when subsequently cooled and left exposed. It was found that in 16 hours eight colonies per cc. were obtained and by 41 hours 74,183.

> " When the water was loosely covered with a box . . . . the numbers of colonies were as follows :—Eighteen hours, 8 ; three days, 3,816 ; five days, 26,737 ; ten days, 20,925 ; twelve days, 6,754. From the foregoing experiments, it is shown that there is a progressive increase in the number of bacteria and then a diminution. The contamination is very much less in a covered can. It will therefore be apparent that a laboratory examination of water, for the presence of amoebae and pathogenic bacteria, that is presumed to have been boiled within forty-eight hours from the time that it is used, may serve as satisfactory evidence to present before a court."

A sound rule to follow, when on travelling duty in the tropics, is not only to make sure that drinking water has been boiled and subsequent contamination prevented but where feasible, to convey sufficient correctly protected boiled water from the last camp to the next, so as to give time for selection of a new water source at the place of arrival. This is a petty point but one that may influence the invaliding and mortality rate of officials.

SANITARY RULINGS.

LEGALISED WATERED MILK.

In the Report on the working of the Rangoon Municipality for 1913–14, it is recorded that there has been a demand by that body for improved legislation as to milk supply. After pointing out that quite 80 per cent. of the total milk supply of the city is received from outside Municipal limits, the ends desired to be observed by increased legal powers are described as follows:—

> " Briefly stated the scheme of the Committee is to take all reasonable measures to ensure that milk shall not be drawn from diseased cows, that the milk from the moment it is drawn to the time of its receipt at the depôt in Rangoon shall not be contaminated or watered, and that if retail dealers desire to sell watered milk they will be permitted under licence to do so, one of the conditions of the licence being that the milk shall be watered at the depôt only with pure water up to a prescribed limit. It must be recognised that in the interests of the poorer classes the sale of cheap but wholesome watered milk must be allowed, and it may be remarked here that the percentage of fat in local milk is greater than that of English cows, so that a fair amount of water may be added without bringing the percentage of fat below that allowed in England."

Of the necessity for action as to milk purity in Rangoon there can be no doubt and, irrespective of care as to the origin of the milk, which is now contemplated after many years' shelving of the question, the Municipal Committee has not asked for its protection from contamination without good cause. It is the custom for milk to be transported to the city or nearest railway station on the heads of coolies in open vessels on dusty roads; and to prevent waste during jolting it was common to find the vessel stuffed with leaves picked from the dust defiled roadside jungle. The passer-by could be accommodated with a drink of milk for cash which on receipt was thrown into the milk vessel, either as a safe receptacle or as a return by the bearer for value taken. But there seems less sound reason to support Municipal action in encouraging the sale of watered milk. Of course there is in England the precedent of the legalised sale of a mixture of chicory and coffee, but such a mixture might deprive a buyer of much coffee without more harm than the deprivation of a temporary stimulant. But to legalise watered milk tampers with nutrition. In defence of this scheme the Municipality points out that buffalo's milk, which is that chiefly sold, is so rich in fat that it will bear dilution, and that it is in the interests of the poor that this be allowed. The latter is the strong part of the argument, but it assumes ignorance on the part of the poor as to the quality of good buffalo milk (with which they and their forefathers must have been well acquainted) and their desire to pay for water that they may have fictitious milk. However, granting this much, it is evident that it would require an expensive analytical and executive staff to see that milk watered by the Municipality is not again watered by the vendor. If such doubt arose, there would ensue much swearing by the vendor as to actual care during the act of dilution by the Municipality, the chemical quality of their water as contrasted with the vendor's and the original constituents of the milk, etc. Moreover, the fact that the use of the cream separator is well known in Rangoon might result in milk being diluted that could bear no further diminution of its total fats.

There is also the possibility that although where caste is concerned (and the number of Indians in Rangoon is very large) there may be no objection to forgetting that water is added when purchasing from a "gowli," this might not be the case if Municipal employees added water as proposed.

VILLAGE WATER SUPPLIES.

The Madras Government has ruled that all villages possessed of more than 500 inhabitants shall possess at least one source of water supply officially recognised by the Sanitary Department as protected (*Report of the Sanitary Commissioner for Madras*, 1913.)

IRRIGATION AND MALARIA PREVENTION.

At the 3rd All India Sanitary Conference at Lucknow, a member of the Madras Legislative Council, the Hon. Rao Bahadur RAMACHANDRA RAO gave it as his opinion, amongst other suggestions for the mitigating of existing evils incident to irrigation in certain areas in India, that Local Governments should rule that "in regard to pending and future projects of irrigation, the desirability of making provision for such initial expenditure on the sanitation in the area commanded by the project as may be found necessary, on account of changes consequent on the introduction of irrigation, be also considered." This practical suggestion if put into effect would doubtless prove not only saving of human life but of importance in the economics of the country.

EAST AFRICA PROTECTORATE.

In the East Africa Protectorate, during 1913, the following, amongst many other, rulings were sanctioned :—

Leprosy.

Provision was made "for the isolation and detention of persons affected with leprosy."

Ways and Means.

"The Secretary of State authorised the utilisation of the proceeds of the auction of Crown lands for the purpose of constructing roads, communications and other development works."

Drainage of Premises.

In all subsequent leases from the Crown clauses were to be included compelling an owner to connect his premises, plot or area with any drainage scheme when completed.

Control of Building Sites.

At page 53 of the *East Africa Protectorate Annual Medical Report* for 1913, the Medical Officer of Health, Nairobi, gives proofs of the necessity for rulings that shall effectually prevent persons building or allowing others to build within their freehold premises without official sanction

He shows how, regardless of sanitary risks involved in overcrowding, owners "out for money" divide and sub-divide building site land bought at small cost, so as to secure disproportionate gains. He gives concrete instances of which the following is a sample:—

> Owner A pays to Government Rs. 48 per annum for a plot of ground 100 by 20 feet. He divides the plot into two portions. These tenants again divide the area, so that ultimately on this small plot of ground buildings to the total value of Rs. 1,500 accommodating 25 persons are erected. The original owner A pays to Government Rs. 48, but receives Rs. 1,776. His sub-tenants B and D pay Rs. 996, but receive Rs. 984.

Inoculation with Haffkine's Vaccine.

The following are extracts from a Circular issued on the subject of protecting racial prejudices:—

> "In all cases the husband or representative of the family should be informed of the intention to inoculate, and he should be present at the time such inoculation is performed. Under no circumstances should any inoculation be performed on any Asiatic or Arab woman unless a previous request from the parties concerned has been received and such request recorded in the office for reference.
>
> Under no circumstances should any representative of the Medical Department enter any house for the purpose of inoculating Asiatic or Arab women, unless a specific request is presented which must state the reasons for such entry."

Sleeping Sickness.

By an order in Council, sleeping sickness has been added to the list of infectious diseases, under Section 32 of the Health Ordinance, "which gives power of arrest and compulsory detention in a contagious Disease Hospital."

SOUTHERN NIGERIA.

Prisoners' Diet.

In the Annual Medical Report for Southern Nigeria for 1913 (p. 19), it is stated that "Under the Prison Ordinance by Order in Council No. 12 of 1913 diet scales for European and native prisoners were published."

Surveillance "Permits."

The following Regulations have been made applicable to Southern Nigeria under the Infectious Diseases Ordinance of 1908:—"Every person permitted to remain as aforesaid shall be given a permit as prescribed, signed by the Medical Officer."

Sanitary Zones.

The Acting Senior Sanitary Officer, Southern Nigeria, in the Annual Medical Report (p. 46) for 1913, states:—

> "Soon after the arrival of the Governor-General in Southern Nigeria, His Excellency directed his attention to the solution of the segregation problem. . . . The view held, and it seems a thoroughly sound one, is—where Europeans or natives cannot be transferred to new sites outside

existing towns—to have a European Reservation delimited and a native free zone of a quarter of a mile in extent all round marked out on a town plan. This native-free zone may be inhabited at present by Europeans or natives, but gradually, as their leases run out, they will be permitted to obtain new leases of land in the specific areas to which they belong, and eventually the free zone will become uninhabited although offices, stores, etc. may be retained thereon."

CHOLERA CARRIERS.

The following is a copy of a Circular issued in the Philippine Islands, under the authority of the United States Public Health Service :—

> **" . . . It will be necessary hereafter, before bills of health can be issued, to present to this office a certificate for each steerage passenger embarking for Honolulu, or the United States, to the effect that his stools have been examined and found free from cholera organisms. This also applies to such steerage passengers as are bound for Honolulu and the United States, who go first to Hongkong or other Oriental ports to embark there." (*U.S. Public Health Service, Public Health Reports,* 1914, Nov. 6, p. 2,987.)**

CEREBRO-SPINAL MENINGITIS AND TUBERCULOSIS.

The Corporation of the City of Madras resolved that the above mentioned diseases "be declared to be dangerous diseases" under Section 3 (7) (*b*) of the Madras City Municipality Act, so that medical practitioners, hakims [Mahommedan practitioners] and vaidyans [Hindu practitioners] may be compelled to notify to the officers of the Corporation the occurrence of such diseases under Section 363 of the Act (*Administration Report of the Corporation of Madras* for 1912–13, p. 5).

DISPOSAL OF WASTE.

THE ECONOMICAL VALUE OF RECLAIMED MARSHES.

At Coomassie the Medical Officer of Health reports that " Anopheline mosquitoes are numerous, especially from April to October. By means of open ditch drains the swamp to the west of the town and the east of the segregation area was taken in hand during 1913, and great improvement was effected; part of the swamp has been reclaimed and converted into a vegetable garden."

During 1913, the Corporation of the City of Madras made a profit of over Rs. 40,000 from the cultivation of grass on sewage farms. Certain of these farms are upon former salt-marshes, which have been filled and raised in level by deposit of municipal rubbish; but the larger area was a tract of nothing but sand—a recent deposit from the sea—which, without other soil admixture, under the stimulus of sewage, now yields magnificent crops of grass for fodder.

SANITARY WORKS.

Exclusion of Storm Water and Silt from Sewerage Systems.

Mr. **Madeley**, M.I.C.E., Special Engineer, Corporation of Madras, at the Third All India Sanitary Conference at Lucknow*, read a paper conveying matter of much utility on the above question. The subject has an importance in reference to the seasonal rains of the tropics and the habits of certain races, which do not present difficulties in European countries.

In regard to storm-water, there is the fact that in the tropics for many months in the year there may be no rainfall; hence the dry weather flow in a sewerage-system may be nothing but sewage, whilst in the rainy season the amount of storm-water, if included, may be enormous. These factors ordinarily dictate the necessity of separate systems for sewage and storm water, so that economy and efficient working be maintained. Under European conditions of household life there need be no difficulty in rigidly maintaining separate sewage and storm-water, or more or less combined systems. But the average non-European of the less wealthy classes in the tropics finds little space in the interior of houses for personal ablutions, and the washing of clothes and utensils; these and many other domestic matters being attended to in a small yard attached to the building. Even where land is of great value and the flat system of dwellings is pursued, a common yard for tenements is a feature when possible. The retention of cattle in these yards may complicate conditions where any but the water carriage system is employed; whilst faecal matter in bulk is otherwise dealt with, the washings of latrines are received with sullage. Hence, it would seem no less desirable in the tropics than in European countries to treat the first storm water flushes of house premises as sewage. If this be accepted, the sewerage system must be so designed, and, if a reasonable size of sewer is to be maintained, at convenient points storm-water overflows must be arranged. Nor are these the only complications met with; in some of these yards husks of grain, fragments of straw and, especially, sand, earth and ashes used for cleansing cooking utensils may mingle with a sewage rendered glutinous by the washings of boiled grain; so that the prevention of silting sewers has to be considered from other points than the mere maintenance of self-cleansing velocities in sewers, as held sufficient in Europe. It is to the solution of such difficulties that Mr. Madeley has set himself.

As Special Engineer for Madras City, where both the water supply and sewerage systems are under active revision, he has had excellent opportunities of studying the questions involved.

The writer confines his present remarks to Mr. Madeley's proposal for house connections, where the problem presents conditions markedly peculiar to the tropics. Mr. Madeley classifies the methods he suggests according to the nature of habitation to be treated. In the first class he would place houses of more or less European character, where it is possible to use the water carriage system, with the usual adjuncts of water-closets, baths, lavatories and sinks. Here no unusual difficulties present themselves, and he therefore dismisses the subject without discussion. He then defines the other classes:—

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* Proc. 3rd All-India Sanit. Conference, held at Lucknow, Jan. 19–27, 1914, Vol. 1. p. 12 and Vol. 3 (Suppl. to Indian Jl. Med. Research), p. 194.

> "Second class drainage, retaining the existing open house drains. This system is used for the ordinary small houses of Madras, in which it would be most unwise to introduce underground drainage.
>
> "Third class drainage for paracherries and collections of huts where each habitation cannot be provided with a separate sewer connection. These groups of dwellings are provided with sufficient [public] latrines for the inhabitants while a good class of open drain is constructed to remove sullage water from kitchens, etc."

Mr. Madeley's method of separating rainwater from sewage will be best understood by reproduction of his arrangement in a typical house of the second class (fig. 1)*. He thus describes the method:—

> "The separation of rainwater from sewage in second class house drainage systems is effected by small brick or concrete curbs as shown in red . . . . These curbs divide the courtyards into washing places and rain water areas. Rain falling on the roofs pours off the eaves, and falling on the courtyards it is caused to flow at once into a 'U'-shaped storm-water drain by which it is conveyed to the street side drain. The soiled water from washing places, and that from household utensils, is directed by the curbs into the sewage drain coloured yellow. A good deal of washing is done on the verandahs surrounding the courtyards. A small open channel is therefore constructed round the margin of each courtyard and is protected from rainwater by the usual curb. It will be seen . . . . that this channel from the verandah empties into the sewage drain. By this means a practical working separation of rain water from sewage will be effected.
>
> "In some cases the rain water and sewage drains are closed for short distances. For instance, the sewage drain is closed where it is found that rainwater will enter it, and the rainwater drain is closed wherever there is danger of sewage flowing into it. Governing these two principles is that of free access, and no drain or part of a drain should be allowed to be constructed that cannot be quickly examined and easily cleaned, when necessary. . . . . In some cases it has been found advisable to supplement the use of curbs with eaves, gutters and down pipes, but in most cases curbs are sufficient."

He states that the curbs exclude much silt, pot scourings, etc., but "for many years to come, special means for excluding silt will be required at house connections of the second and third classes." Hence, he has designed a special silt catcher. This "consists of a steel bucket fixed in a masonry pit on the house drain . . . . . The silt settles and accumulates at the bottom of the bucket, while the liquid flows over the rim on its way to the syphon trap" (fig. 2).

In treating third class houses, Mr. Madeley advocates the retention of open drains within the yards so as to receive household sullage from kitchens as well as rainwater, and for these to discharge into roadside drains protected by low curbs on the road side a little higher than the road level, so as to prevent debris from the road being washed into them. These drains then lead into silt traps at convenient positions at junctions with the usual types of sewers. These traps are designed so as to exclude a desired amount of storm water by means of (1) ordinary overflow weirs, (2) leaping weirs, (3) plate weirs, (4) the Madras storm water separator. These first three are adaptations of well-known principles. In the fourth, the ball valve method is brought into operation, and is used so as to throttle the exit of the trap.

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*The colours in the original are replaced by hatching.

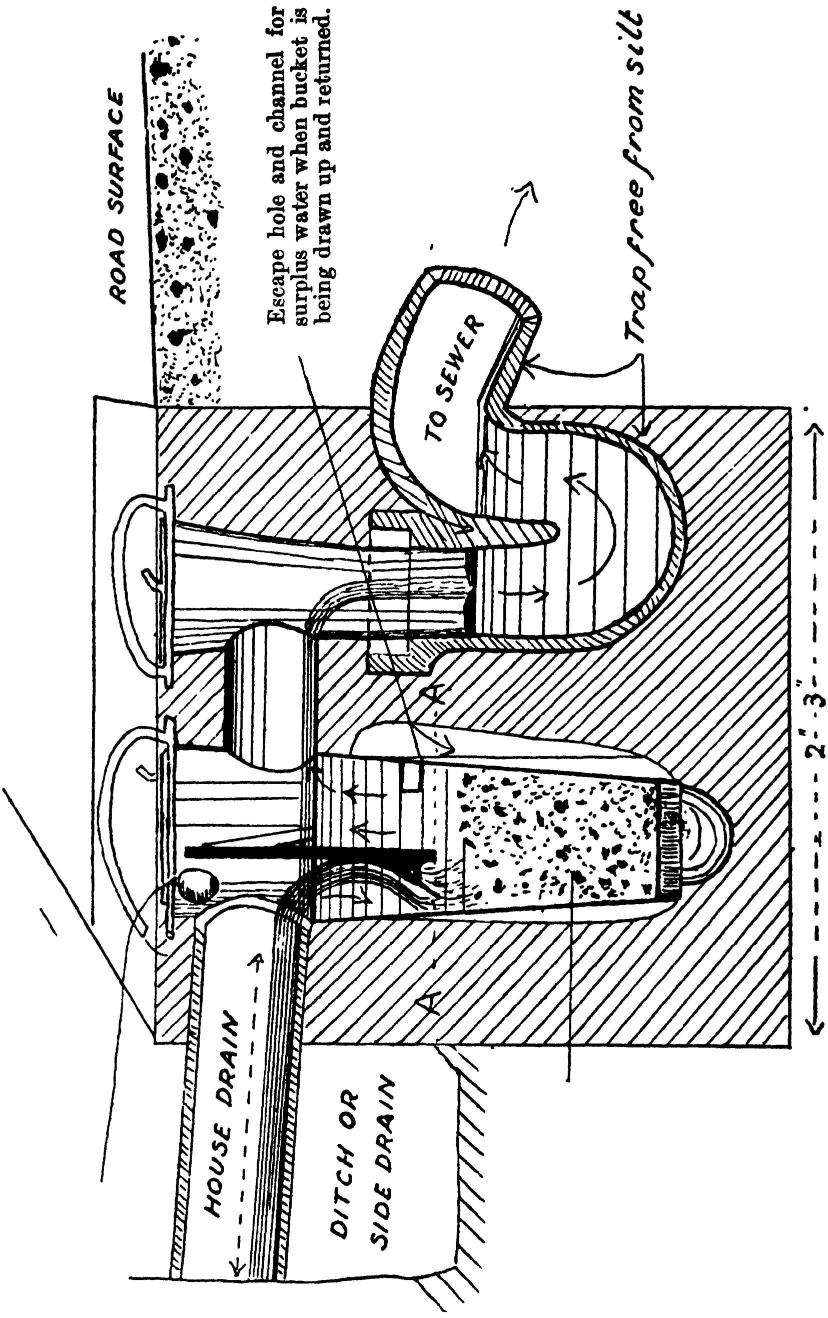
ROAD SURFACE
Escape hole and channel for surplus water when bucket is being drawn up and returned.
Trap free from silt
TO SEWER
A
A
2' 3"
HOUSE DRAIN
DITCH OR SIDE DRAIN

FIG. 2.

In treating third class houses, therefore, Mr. Madeley receives both sullage and storm water together by private and public drains up to the sewer junctions, and these largely remove silt and reject surplus storm water by means of silt traps.

Mr. C. C. James, in his "Drainage Problem of the East" (Vol. 1, p. 3) thus states his concurrence in the necessity for the keeping of storm and sewage flow separate in the tropics:—

> "The author's experience leads him to prefer carrying the subsoil and surface water in one drain, and all sewage and such rain water as falls on small courtyards and sweepers' passages or gullies in a separate sewer; and in spite of its extra cost he believes this system to be generally the best suited to Eastern countries, in which the rainfall is confined to a few months in the year. No hard and fast rule for the adoption of any one system can, however, be laid down; the ultimate verdict must rest upon the fullest consideration of local conditions."

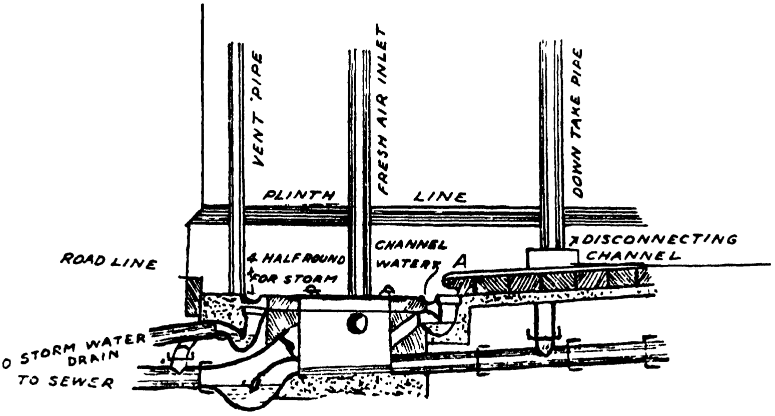

Fig. 3.

Above (fig. 3) is shown his mode of using the leaping weir (at A), so as to separate storm water and sewage within private precincts.

A method which the writer proposed in 1889 for a rural town may be found of use for what Mr. Madeley would classify as third-class dwellings, in accordance with Mr. James's policy of following no hard and fast rule*. The aim was to secure that all sewage and a *fixed amount* of storm water, such as would represent the first washings of yards and streets, be received in the same sewers (unaided by a second system for carrying storm water), with the reduction of the household additions of silt to a minimum, and the throwing upon the householder the onus of blockage and drainage of house drains; whilst requiring the Local Authority to provide for each house an efficient ventilated trap between the house drain and public sewers immediately outside the premises, in a position rendering its inspection an easy matter. It is obvious that under tropical conditions of rainfall such a system, unless at intervals relieved of storm water, would degenerate into a "combined system" with expensive sewers of a size absurd in respect to the dry weather sewage flow; or a modification of the method, by overflows into short lengths of special storm water pipes discharging contents in particular directions for selected areas, would become necessary—a method which has its merits in many circumstances.

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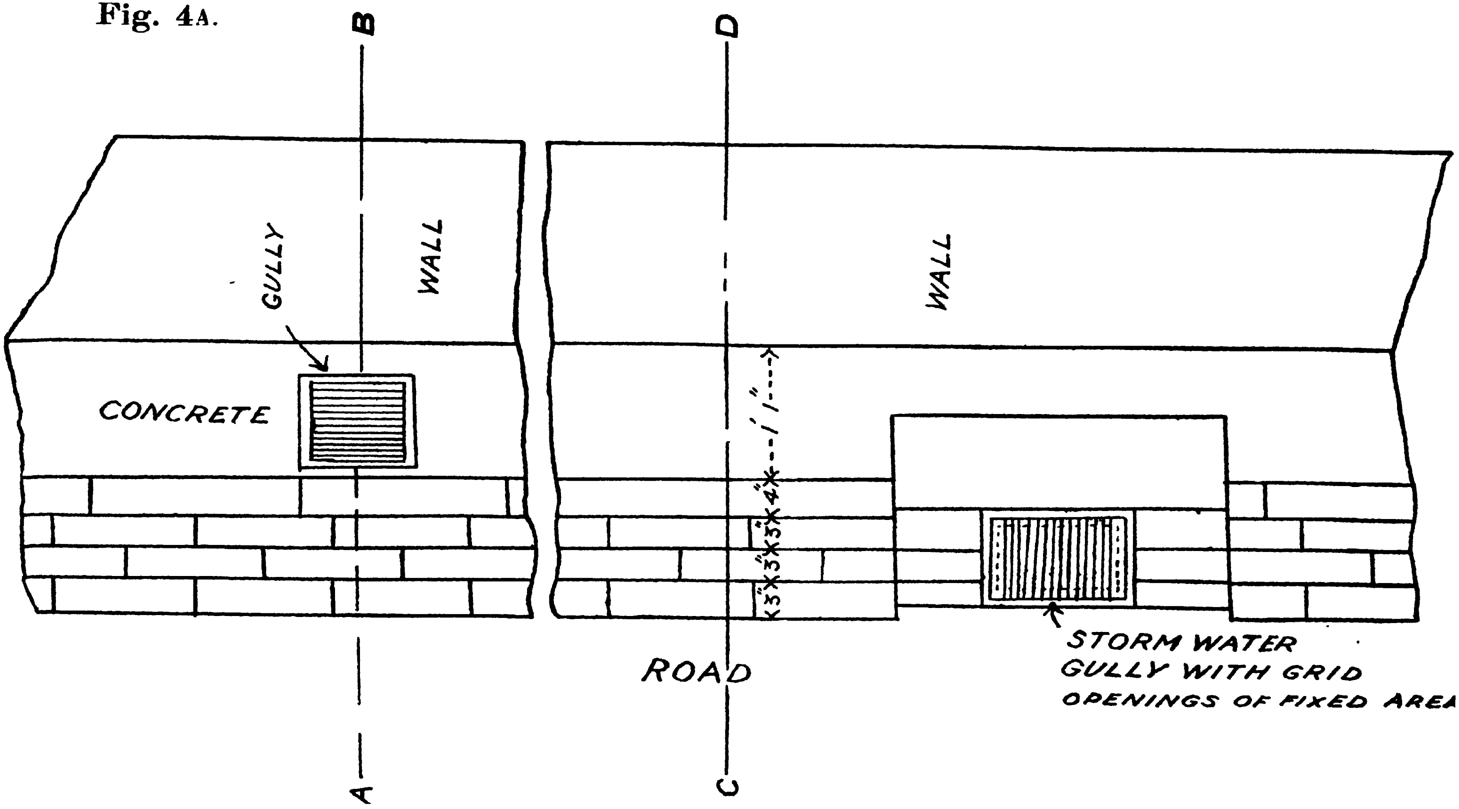
*The result in practice cannot be stated although the method was formally approved by the Engineer authorities of the Government concerned; the Local Authority of the period suffered from "want of funds."

Fig. 4A.


B
D
GULLY
WALL
WALL
CONCRETE
1' 1"
3" 3" 3" 4"
ROAD
STORM WATER
GULLY WITH GRID
OPENINGS OF FIXED AREA
A
C

Convenient points for overflow, where what would be highly diluted sewage could be safely disposed of, were in this case, however, obtainable. Ventilation of sewers was very completely arranged for by open-grid manholes and lamp-holes, with special regard to the fact that no ventilators could be afforded within third class premises. With these two points secured, the further details of separation of sewage and storm water were rendered possible.

In a town devoid of undrained depressions, and possessed of a fairly good gradient towards a natural drainage outlet, if removal of first storm water washings has been secured, there is no need to demand that rain water shall disappear from view as fast as it falls. So far as private yards of third class dwellings are concerned, ordinarily they are graded so as to direct flow towards the road on which they are built, and if not can be inexpensively so graded. This being so, it is rarely necessary to make any special rainwater drains within private precincts.

In the interests of exclusion of extraneous matter from yards and unlimited rainwater, it is undesirable to have any portion of the drain for receipt of sewage open. In the present day dread of mosquitoes, roof guttering or any other method of delaying discharge of rainwater from dwellings is best absent.

In areas where third class dwellings prevail, foot pavement not being likely to exist, the road drains usually are close to house walls.

Holding these various details in mind, the writer's method (fig. 4) will be understood. Along each street to be drained a concrete apron was run along the frontage of the houses, with the object of striving against penetration of damp and guiding rain water from frontage eaves direct, and indirectly from the rest of the houses, through their yards which are graded to the front by a simple slope, to the road gutters. The rain water was sent on its route to the sewer, where it had to pass through a storm water road gulley—provided with a silt trap—the grid of which, in each case, had openings allowing only the predetermined flow of first washings for the area concerned; or, in other words, the area having been surveyed, and the rainfall thereon estimated (according to the fraction of the total intended to be received), the road gullies were placed at calculated intervals. The house drain was provided with a Buchan's trap open to the air within the concrete of the apron, immediately outside the houses served. Its elevation precluded its being flooded by the street drain storm water surplusage. At this point also, the curb of the road drain was sufficiently elevated to act as a guard to the trap from carelessly driven bullock carts. The underground house drain served the washing platform, which was provided with a common stable gulley trap with the usual dirt basket; and as the platform was surrounded with curbs, the normal sullage flow was not added to by rainfall, unless by the platform area. The platform could of course have been protected by roofing in many cases. The separation of sewage and rain water within the premises was therefore reasonably complete. The trap outside the house was public property; the platform gulley and the pipe were the property of the tenant, upon whom would rest the onus of allowing his gulley or his pipe to silt up and so cause obstruction; whilst the public authority remained the guardian of the junction to the sewer, and was responsible for the cleansing of the house traps of allowable matter, which might escape the tenant's gulley. Under this system, the writer believed it was possible, at little expense, to convert a scheme for receipt of sullage water and first storm water washings into a water carriage scheme of sewerage.

LAUNDRIES.

The Medical Officer of Health, Nairobi,* adverts as follows to the importance of laundries in their public health aspects :—

"Piped water at Nairobi derived from the town supply is used; this precaution represents practically the only safeguard to the public. The municipal quarters are fairly satisfactory, where 20 persons are each provided with one room for sleeping and living. No provision is made for boys, and the drainage is unsatisfactory. In other towns in the country the provision of public laundries is a matter that calls for consideration."

This description of existing conditions leaves much to the imagination; but it may perhaps be safely assumed, having regard to the emphasis upon the use of tap water being the *only* safeguard available, that the living rooms and those for storage of clean and soiled clothing are one and the same. Under such conditions, the employers of the washerman (the "dhobie" of India) are liable to share to some extent the family troubles of their employees. In certain parts of India, this is met by families engaging a permanent dhobie resident within their premises, but even this precaution does not get over possible complications; as, in the absence of careful supervision, the mingling of clothing of servants and especially surreptitious introduction of that of outsiders, to swell the income of the dhobie, become probable. Nor is it only the employer whose interest has to be considered. When Local Authorities fail to secure legal rulings to place the whole subject of laundries within their control, these may, through infection of washermen families by receipt of contaminated clothing, become foci for spread of epidemic diseases. For example, where ill-protected shallow wells furnished both the domestic and washing water supply, the writer has known an epidemic of cholera thus maintained betwen families and dhobies of localities wide apart. Moreover, as he has also found, the washerman is apt to find bed-sheets or table cloths make excellent coverings for cholera or small-pox corpses.

Hence it would seem essential that, as soon as any pretence at sanitary control is possible in a locality, the laundry question should be attacked. The writer considers this is best done by Local Authorities taking power to licence laundries and attached buildings and thus secure control, in each individual case, of water supply, method of washing, and storage of soiled and clean clothing. In using the power care must be taken to deal with washerman in classes, so as not to thrust upon them charges that would be recovered at the cost of the poorer employers and thus limit cleanliness; therefore in the lowest class, no charge should be made for the licence issued. Where the washerman cannot afford to bring his private premises up to the standard required, the use of cheap public wash-houses (without fees) will ordinarily solve the difficulty.

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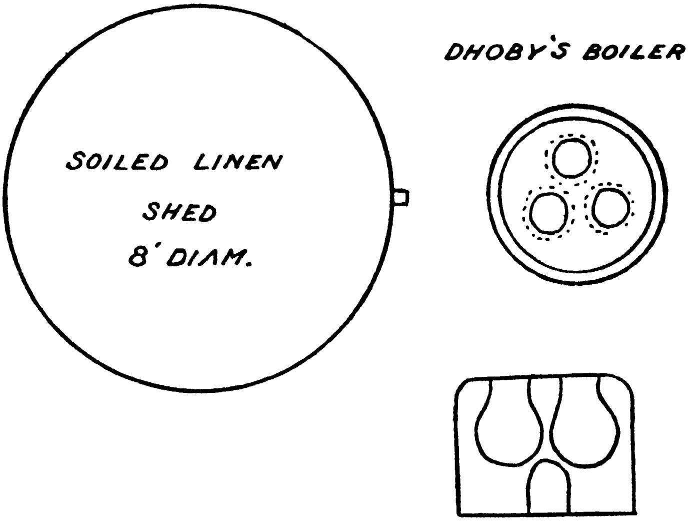
*EAST AFRICA PROTECTORATE.—Annual Medical Report, 1913, p. 55.

Fig. 5A.



Appended is a plan (fig. 5) showing a type of cheap public laundry suggested by the writer in 1882 for the city of Madras. It contemplates the use of two circular sheds of smooth impervious material devoid of corners and provided with impervious shelves for receipt of clothing. The sheds are to be placed on raised platforms of masonry with a floor of concrete covered with smooth stone slabs having cut and cemented points, or with cement plaster. Each washerman is to be provided with two sheds opposite each other—one for the storage of soiled, the other for clean clothing, starching and ironing, etc. Between the two sheds is to be placed the washing platform. This is to be provided with water either from a public service or from an elevated cistern, to which it is pumped by bullocks or kerosine engine power from wells or other source. It will be noticed that the platform is provided with the usual washerman's stone for pounding clothing, and with an earthenware vessel for water into which clothing is dipped before pounding. The vessel being of moderate size compels frequent renewal from the tap, and it can at little cost be destroyed at intervals. The platform is to be extended in proportion to the number of washermen—each having his private portion. It has a slope which, whilst not so great as to inconvenience the washerman, conveys rapidly the foul water to a drain* for disposal by broad irrigation, filtration, etc. Boiling arrangements are supposed to be conducted in earthenware pots, in the usual type of Indian " boilers."

The sheds can of course be made of corrugated plain or galvanised sheets or reinforced concrete, with shelves of stone slabs, hard wood, or reinforced concrete. Where there is money to spare, the ideal would be sheds of reinforced concrete smooth cement plastered in the interior, or lined with white glazed bricks. The ventilation area above and below should be rat-proofed. The premises should be completely enclosed. In working this public laundry each washerman would provide his own padlocks for the two sheds; the keys to remain in his possession.

The type shown provides sheds of a small area and, in most localities, should represent a cheap investment. For a locality of any importance, the addition of drying sheds, bleaching grounds, tailor's room, steam-disinfecting machine, guard-house, office, conservancy arrangements, etc. would be desirable.

Makeshift Laundry.

When confronted with shortage of water for washing purposes, other arrangements being temporarily impossible, a " better than nothing " method (instead of allowing the tropical predilection for clothing being washed direct in a scanty pool of water) is to cause the washermen to put their pounding stones on the top of the best resemblance to an aerobic filter that can be made with local material on the banks (see page 460, diagram C, Sanitation No., this *Bulletin*, Nov. 8, 1914); even if it is nothing more elaborate than sand placed over graded gravel to a total depth of 3 to 5 feet, resting at its natural slope without enclosing walls. The used water would return to the

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***A type used in India permits the washerman to stand in small reservoirs of water in which clean and foul water mingle.**

pool from each man's "filter" in a condition that, if not bacterially sound, would be decidedly better than without this aid. Alum precipitation of the pool contents would be good final treatment.

POT WELLS.

In regard to improvements of water-supply in the Presidency Division of Bengal, the Government of Bengal*, after coming to the conclusion that the working of the Union Committees "was on the whole unsatisfactory," find some hope of their improvement in the statement that, in one of the Districts of Nadia, there has been "some attempt to improve the water supply by sinking earthenware pot wells and clearing jungle." This first step of the Union concerned, in respect to water supply, is certainly decidedly primitive; nevertheless, the Indian pot well, if slightly modified, has some merit. Normally, it consists of rings of unglazed earthenware without any bevelling or other arrangement for securing tight fitting. Except in the latter respect and in the absence of glaze, they have their prototypes in similar rings for wells, and man-holes for sewerage works, supplied by European stoneware manufacturers.

The writer considers these wells are (within the limits of the disability of being open) often capable of being used with sanitary efficiency, by the expedient of giving to the rings of earthenware a backing of puddled clay or concrete. If six inches of concrete be used for the upper three feet of the lining and both rings and concrete be continued above the surface, so as to form a parapet, and a platform with drain be added, a very fair grade of protection from surface and sub-soil contamination is secured.

If the native potters in the Gold Coast area are capable of making earthenware rings for pot wells, they would fulfil a useful function cheaply, under the circumstances described in the following extract from the Medical and Sanitary Report for 1913:—"In the Northern Territories the question of water supply is acute during the dry season, and large prices are asked for small quantities of water. Wells are dug but, being in sandy soil and their sides being unlined, naturally fall in during the short rainy season."

Pot wells make an excellent substitute for shallow excavations for substream water in sandy beds of rivers, and are frequently used in this way by Indians. The writer has used these wells for securing rough filtration of surface water of rivers, by making an excavation about ten feet square and five feet deep on a bank and filling this with gravel and sand or other available filtration media. A small channel or pipe should lead the water from the river to the top of the filter and, if the gradient of the river is sharp enough, an exit should be provided for the water at surface level at the distal end of the filter. If during the construction of this roughing filter a pot well be made at the centre, this will be filled by upward filtration and at least be of advantage in freeing the water of silt.

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*Resolution reviewing the Reports on the working of the District Boards in Bengal. 1912–13.

WATER CONSUMPTION IN INDIAN CITIES.

Mr. STREATFIELD, I.C.S., Chairman of the Municipal Board, Benares, at the 3rd All India Sanitary Conference* in his remarks upon water supply stated :—

> "So far as I am aware, no one has settled what is the legitimate consumption of an Indian City. It would be extremely interesting to hear the experience of any town in India, if there is one which gives a continuous supply with a reasonable pressure. I do not know if there is such a town. Certainly this question of water wastage is one of the biggest that has to be grappled with now by Indian Water Works."

If the question of waste, which may accompany the "reasonable pressure" (a point open to widely different opinion as to fire and power use) be put aside, and only legitimate domestic use be considered, it is possible to answer the query, with the caution that habits differ widely in various parts of India. In the Madras Presidency such an enquiry was conducted by the writer in 1896. The various domestic uses of water having been defined, with the aid of Medical and Sanitary Officers of Districts, trustworthy subordinates were deputed to undertake a complete measurement of the amount in use during a seven-day period by average cleanly families. He is satisfied that the water *consumed*, and not merely that drawn for possible use, was actually measured in all cases.

In Madras City, within an area where the public water supply wa continuous but had to be drawn from a standpipe ten yards distant it was found that the amount used was 13·20 gallons per head, of which only 2·20 gallons was from the public supply—the rest being from a shallow well within the yard. In this case, the observation was for ten days. In another family, where the public supply only was used, the amount was 14·61 gallons per head. In the Mufassal (up-country) districts the total average was 16·9 gallons per head, in all instances drawn from wells or tanks by hand and carried over varying distances. From this the writer concludes that in towns if water be used for municipal purposes, and moderate fires, trade purposes and waste be allowed for, the *minimum* for a small town composed largely of Hindus should be 25 gallons. Of course, against such an opinion it is always possible to quote instances of towns having water supplies for several years, where the consumption for all purposes per head of the population may not exceed 10 gallons ; but, unless it be shown that domestic wells have been closed and filth-laden tanks eschewed by the public, arguments based on facts so gathered are valueless. It may equally be added that in towns which retain their old contaminated sources of supply, whilst to some extent employing public water supplies, the inhabitants do not reap fifty per cent. of the life-saving value of the latter.

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*Proc. 3rd All-India Sanitary Conference held at Lucknow. Jan. 19-27, 1914. Vol. 5. Papers. (Suppl. to Indian Jl. Med. Research), p. 226.

VITAL STATISTICS.

RACE AND MALARIA.

In September, 1914, on the Panama Canal, the admission rate to hospital and quarters for malaria was 64·30 for blacks, as compared with 144·25 for whites. For the year 1913, the "constantly sick" rate for all causes was for whites 31·68, coloured 11·76. The question of race effectiveness in this area, as judged by statistics, however, is complicated by the fact that "the whites receive pay for 24 days per year while sick from disease, while the blacks do not" (p. 6, *Report of the Department of Health, Panama Canal.* 1914. May).

INFLUENCE OF MALARIA ON THE BIRTH-RATE.

Major W. H. KENRICK, I.M.S.,* has shown how greatly malaria depresses the birth-rate in the Punjab, and that the "reduction begins nine months after the epidemic and reaches its height exactly nine months after the epidemic attains its maximum." He believes that by tracing the seasonal birth curve it is possible "for the course of an epidemic in a Province to be mapped out by a study of the birth statistics only." In contrast, he shows that in a healthy area in the Central Provinces births "are least in numbers during the early months of the year and greatest during the autumn months, the highest point being in October or November." He considers that the probable reason for this is that the early part of the year is the most healthy, and at the same time the period of the harvest—in other words, the time "when the physical and economic condition of the people" is best suited for fertilisation.

Major J. C. ROBERTSON, C.I.E., Sanitary Commissioner with the Government of India, holds that, assuming the number of women liable to conceive remains the same in each month, the tendency of malaria prevalent from August to October would be "(1) to abort the conceptions of June and July, (2) to prevent conception from August to October, and (3) to cause premature delivery in the conceptions of the previous October, November and December." He further believes that "the similarity of contour of birth-rate and death-rate curves is the true one [and] is confirmed by the fact that, in places where there is marked double malaria prevalence yearly, there is also, as we should expect, a corresponding double rise in the birth-rate curves."

On the other hand, the following are the conclusions of a study of the birth and total death-rates by the Health Officer, City of Madras, as stated in his Annual Report for 1913 (page 27):—

> "It seems to be the rule that August, September and October are the most productive months, as these show an increase of as much as 20–40 per cent. over the months of January and February in each year. The greatest number of conceptions therefore takes place during December, January and February, *i.e.*, the cold weather. A comparison with the death-rate shows that the month of maximum birth-rate coincides with the month of minimum death-rate."

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*Lancet, January 25th, 1913, p. 233.

As to the seasonal death-rate, which is referred to in the preceding quotation, he shows, at p. 34 of the Report, that September affords 50 per cent. less deaths than December and that the largest amount of deaths occurred in that month. Of the total deaths in Madras, he calculated that 13·4 per cent. are due to malaria and adds in respect to the worst Divisions of the City (Tondiarpet) that as "the death-rate from malaria varies between 11·5 and 15·5 it may be better imagined than described what the morbidity rate must be."

Captain E. C. HODGSON, I.M.S., Special Malaria Officer for Madras City* gives the following definite statement:—"I wish also to strongly call attention to the fact that malaria appears to be shown to occur almost entirely during three months of the year, *i.e.*, from December to the end of February, *i.e.*, the coldest part of the year." Maximum malaria death-rates and conceptions therefore coincide in Madras City. Information gathered from the birth-rate cannot, therefore, be regarded as of so definite a nature as to permit of a malaria epidemic in so large an area as a province being "mapped out by a study of the birth statistics only." In at least the South of India, the birth-rate of Indians may be disturbed at intervals by the consummation of marriages temporarily deferred, in accordance with a belief in impending calamity as judged by Hindu cycles; and it may assume annually a sudden exacerbation owing to selection of periods which, by popular consent, have for hundreds of years been regarded as auspicious "marriage seasons." Not only customs of the people, but local conditions must also be taken into consideration. For example although, as shown by Major KENRICK, the only difference between a healthy and malarious tract may be physiographical features—the people being of the same race and habits—it would be necessary to ascertain whether these features do not determine the time, number and nature of harvests, which he regards as largely influencing the health and economic condition of the people, and therefore their fecundity. It being understood that first marriages are by the young and comparatively vigorous, this may, even in malarious tracts should there be a recognised marriage season, raise the rate to a maximum by excess conceptions within the first three months of marriage.

In the ten years average preceding 1895, in Districts in the Madras Presidency, the apex occurs in June in two districts, in July in ten, whilst August disputes precedence in four. In the malarious District of Cuddapah, the curve commences in July and reaches its apex in October, as well as in two other Districts. Major KENRICK's deductions, therefore, whilst doubtless quite correct for the Punjab, if applied without the modifying factors of local circumstances to other Provinces in India, might result in showing that the most markedly malarious Districts are healthy, because the highest point of the birth-rate curve is in October.

The tendency for a decrease of inhabitants to occur in malarious tracts is well acknowledged. Allowing for emigration in search of healthy localities, the fact remains that deaths often exceed births. All irrigated tracts are of course not malarious, but largely this is the case. Without such differentiation BAIRD SMITH* shows that whilst the result of irrigating an area is to increase the inhabitants by influx for labour—for which he quotes Indian Statistics—in Italy it has been found that "while the inhabitants of the un-irrigated provinces marry in greater number than in the irrigated ones, their marriages are also more prolific." Thus, in the irrigated districts, the average children per family were 4·87, whilst in the unirrigated there were 5·01. When the subject is narrowed by regarding results in admittedly malarious areas, there remains a difference of opinion as to whether the decrease of population occurs by diminution of the birth-rate or by great infantile mortality.

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*Page 179 of the Administration Report of the Corporation of Madras for 1913.

DEMPSTER (of splenic index fame) believed that impotence of the male following the debilitating action of malarial fever has to be taken into account. DYSON, a former Sanitary Commissioner for Bengal, in an official Report in 1895, thus gives his opinion from personal enquiries :—

> "One of the gravest evils, and one which is particularly felt by the Hindus, is the impotency so commonly found in water-logged villages, which results from the deterioration of health produced by constant attacks of fever, and the presence of an enlarged spleen. The men in these villages acknowledge it, and beg for some remedy. As regards impotency in women, the subject is naturally a very delicate one, and any information on this point is very difficult to obtain. But if, however, the existence of sexual desire precludes the presence of impotency, then the women do not suffer in anything like the same degree as the men ; for many were the complaints made in villages that, owing to the impotent conditions of the men, the women showed a decided tendency to lead loose lives."

The influence of lactation upon the catamenia is a matter that cannot well be without its influence in determining the birth-rate. The Indian custom is for mothers to breast-feed infants as long as any supply is forthcoming—a two-year period being common. The death of a child within this period is therefore quickly followed by pregnancy. Hence a high infantile death-rate is liable to be followed by a high birth-rate; but, in the presence of the depressing influence of malaria upon potential parents, the high infantile death-rate may not be followed by a high birth-rate, as it might be in a town where other causes than malaria affect infant mortality. In expressing this view, in the Annual Sanitary Report for the Madras Presidency, in 1893, the writer stated :—

> "In Municipalities, Cuddapah returns the remarkably small birth-rate of 16·1 per mille. This result is probably due to the long recognised influence of continued exposure to malaria in diminishing the fecundity—the total death-rate of this town being 47·3 and that from malarial fever being 32·2 per mille. That this small birth-rate is due to this condition is further illustrated by the fact that, notwithstanding this town gives the highest rate (297·5 per mille of registered births) of infantile mortality in this Presidency, the usual factor of early cessation of lactation has obviously failed to raise the birth-rate. In contrast, I may state that in Madras the next most unhealthy town as to infant life (294 per mille of registered births) the birth-rate was 40·5 per mille, but here malaria is not [1893] the predominant cause of mortality."

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*Italian Irrigation, p. 97, Vol. I.

The following note of an incomplete enquiry by the writer in 1887 gives some support to the opinion that decrease of population in malarious tracts is due both to decreased birth-rate and abnormal death-rate of children :—

Town.	Children born to each male in a married life extending from 1 to 20 years.	Children who lived over 3 years of every 100 born.	Remarks.
Pattikonda ..	4·91	79	Non-malarious.
Dhone	1·87	50	Malarious.
Velapuram	1·01	Not ascertained	Very malarious
Cumbum	2·19	61	Malarious.

THE INFLUENCE OF FOOD SCARCITY UPON THE BIRTH-RATE.

Major CLEMESHA, I.M.S.* records a decrease of 70,414 in the total number of births for the year 1913 in Bengal. This he ascribes to the high price of food grains during 1911–12 and 1913 reacting on fecundity. Increase of cost, in 1913, was favoured by destruction of standing crops owing to excessive rains in all the Districts of Bengal, except Chittagong.

An examination of the statistics for the general population afforded in this Report shows that the total death-rate for males in Bengal was 29·77 per mille in 1913 against 30·35 for 1912, and for females 28·96 against 29·17. Here, then, is an instance of continued high prices of food sufficient, as Major CLEMESHA states, to "inevitably lead to a general devitilisation of the poorer classes," which shows its influence by reduction of the birth-rate (the bulk attributable to conceptions that should have occurred in 1912), but fails to raise the death-rate in the face of continued high prices in 1913. It is fair to assume that the decline in the death-rate is, in part, accounted for by 19,117 less infantile deaths accompanying less births; but a noteworthy feature is that whilst the saving of life of males on 23,365,225 was 0·58 per mille, on 22,117,852 females it amounted only to 0·21 per mille, a result that is the more striking as, side by side with it, is the fact that women ran less risks attending child birth.

In this connection, it will be interesting to ascertain whether the high prices of food grains short of the "scarcity rate" reported by the Sanitary Commissioner with the Government of Madras in his Annual Report for 1913 (p. 2) will show their influence in the vital statistics of 1914. He points out that rice, ragi, cholam, and cumbu during the year were sold at 33·8, 27·4, 33·1 and 28·6 per cent. above the average of the previous fifteen years. As the price was much the same as in 1912 and yet was followed in 1913 by a total of 1,288,618 births, or an increase of 43,153 births, the chances are the high prices have not been inimical to the poorer classes in the Madras Presidency. In that Presidency, there is no evidence that shortage of grain has been experienced; whereas, in Bengal, this must have occurred consequent upon destruction of crops. Nevertheless, the Sanitary Commissioner for Madras must have been correct in his remarks on the prices of grain when he states " there is positive evidence that living is becoming dearer nowadays." In the case of Bengal, the disaster to crops must have hit hard the agricultural classes ; whereas in Madras the man of fixed income, more especially those in employment on pay settled during economic conditions which no longer exist, must have felt prices which (excluding the influence of war) are accompanying throughout India improving trade development and increasing price of labour, and with these must be reckoned the levelling influence of distant markets placed at disposal by railways. For example, shortage of grain in the Bombay Presidency in 1911 and 1912, which demanded relief measures by the Government of that area, probably implied an export from Madras of grain and an import of money.

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*In his Report on Sanitation in Bengal for 1913 (p. 8).

Past philosophers pointed to the decreased birth-rate accompanying famines, as a response to a beneficent law of Nature ; if a country were so ill adapted to sustain human life as to permit of famines, it was ordained that the matter be adjusted by a diminution of the population. But in proportion to the population which survives a famine, it has been long recognised that an increase of the birth-rate quickly results, on normal conditions of food supply being approached. The feeble, the old and the very young having been largely weeded out, those of both sexes who survive are by age and vitality specially fitted for reproduction. The Census of the Madras Presidency for the decade succeeding the famine of 1877 (which it was calculated by CORNISH had cost a shortage of population of 3 millions) showed the intercensal rate of increase to be 15·6 per mille, or about double that of the population under normal conditions. Following the famine of 1896–97 in that Presidency, in five affected districts exhibiting a decrease of the birth-rate in 1898 below the five years average prior to 1897, there occurred, in 1899, an increase of 5·9 above that average. A more recent illustration of the same condition is found in the Report of the Famine of 1911–12 in the Bombay Presidency ; at page 10, it is stated :—

> " Last but not least we must note that since the last famine [1899–00–01] the birth-rate has gone up enormously. Forty per cent. of the present population consists of children under 14. In 1901, children under 5 made up only 9·3 per cent. of the decreased population. Now children of the same age form 17·40 of the increased population."

FOOD SCARCITY AND MORTALITY OF THE SEXES.

The conditions described in the Sanitary Report for Bengal, as mentioned in the preceding Note, were therefore of a greater gravity than in Madras, and pressed upon particular classes, but in neither case did famine conditions arise.

The resulting diminution of births in Bengal and the small excess of mortality amongst women is of interest, in view of the difference of opinion exhibited by Mr. GAIT'S quotations from Reports by several officers dealing with the relative death-rates of men and women during famines.* In the famine of 1896 and 1897 in the Ceded Districts of the Madras Presidency, the writer's "conclusions" in the Official Report on the subject were as follows:—

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*Census of India, Vol. I, p. 221.

> "If, therefore, it be conceded that in the affected districts there has been an increased death rate amongst women notwithstanding a diminished birth rate, accompanied by greater mortality amongst the very young (from one to five years of age), and amongst the aged (of and over fifty years of age), and that the rates of mortality of infants and from dysentery and diarrhoea have been abnormally high, it follows that the total loss of population stated to have occurred in paragraph 21 has been brought about by pressure of famine conditions upon the populations concerned."

On the subject of relative death rates of men and women, Mr. GAIT makes the following extract from the writer's Report just mentioned:—

> "During the 1877 Famine, the late Surgeon-General CORNISH, then Sanitary Commissioner, found that deaths among men were far more numerous than amongst women. This he ascribes to the exhaustion following the aimless wandering of the men in search of employment that formed a special feature during the famine of that time. With, however, labour provided for the population, as in the present instance, the women have suffered disproportionately owing, it may be presumed, to the special tax upon their vitality in connection with their functions as mothers, and the extra strain involved in fulfilling domestic duties in addition to the day's work, of a nature most were not accustomed to*. The fact that the wife, according to Hindu etiquette, eats what the husband deigns to leave her also cannot be ignored."

These conclusions are from carefully compiled statistics and practical work in famines, and those of other observers affording a different opinion are equally so founded. Is it then possible to reconcile these views? The writer thinks that it is. Mr. GAIT writes (in a foot note) as follows: "The famine of 1896–97 in the Madras Presidency was not very severe and the excess mortality was slight." The estimate of this famine of 1896–97 as "slight" is correct if the resulting mortality be relied upon, but not if the conditions which had to be met were judged. For example, jowari (*Sorghum vulgare*), which is the staple grain of the Ceded Districts had reached in July, 1897, ten seers of 80 tolas per rupee, against a normal rate of 30 seers. No one would hesitate in pronouncing that *when due to failure of crops* such a rate meant to the Indian agriculturist not "slight" but severe conditions. The famine was, however, "slight" in mortality, for the reason that the lessons of the ghastly famine of 1877 in the Madras Presidency, of which CORNISH wrote as involving greater loss of males than females, had not been thrown away upon the Madras Government. The organisation of labour and relief was promptly directed towards preventing that breaking up of family life and wandering to which CORNISH correctly assigned the results upon the lives of males. Indeed, in the presence of pre-arranged organisation of the present day and ever increasing facilities of rail and road transport, *no future famine should produce any worse results in India than that of* 1896–97, *classed by Mr. Gait as "slight."* Major CLEMESHA's summary of the scarcity being sufficient to "threaten devitalisation of the people," followed by the decreased birth rate and the slightly (proportionately) greater death rate of females than males, shows that a condition was reached in 1913 which must have given him and the Government he served, sound cause for anxiety.

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*An ordinary day's work would imply several miles walk to a "famine work" carrying an infant to be suckled, a full task of metal breaking exposed to the sun, the walk back to the village or other place affording shelter, followed by the pounding, cleaning, grinding, and cooking of grain for the family.

The divergent views are therefore reconcilable, if the different circumstances attending the statistics of famine conditions be taken into consideration and not solely the figures. Thus, speaking from an intimate knowledge of the famines of 1877 and 1896, the writer believes it would be a grave error to found a doctrine that a famine which did not show an increased mortality amongst males is "slight," in the sense that food scarcity must have been trivial. It may be assumed that advancing grades of scarcity will be marked by (1) a diminished birth rate, (2) diminished birth-rate with increased death-rate of women, children and the old, and (3) combined with the latter conditions, a disproportionately larger death-rate of men. When in the present day the last-named results occur, it may be accepted as a safe indication that relief measures have been too late, or that there existed a flaw in methods. In certain of the Reports of the famines of the seventies quoted by Mr. GAIT, the greater deaths of males than females are accounted for as a result of chivalry—*fidelis in arduis*. Without denying its existence, the writer suggests that "wandering in search of work," to which CORNISH ascribes the result in the great famine of 1877, involves the breaking up of families and of numerous factors peculiar to the life of the agricultural classes in India for which the chivalry doctrine makes no allowance.

INVALIDING AND DEATH-RATES.

The death rate amongst 740 European officials under the Gold Coast Government* was 8·10 per mille and amongst European non-officials 8·49. In a population of 796 European employees of merchant firms, the death-rate per mille was 8·7 and amongst mining companies 5·3; whereas, amongst 126 missionaries, the rate was 31·7. The respective invaliding rates were 5·74, 3·96, 1·62 per cent. The Principal Medical Officer makes the following remark on this subject:—

> "The death-rate for Trading and Mining Companies has declined, while that for Missionaries has increased, but the reverse is the case with the invaliding rate, it having increased for Trading and Mining Companies, but declined for Missionaries. I am afraid I can give no explanation of this latter, except that the same applies to the official figures."

The number of missionaries dealt with is of course small, the law of chances may have dealt hardly with them, and this alone may account for the grave rate of mortality. But, in larger figures, it may be regarded as possible to detect an increased mortality rate with a decreased invaliding rate. "Invaliding" is a preventive measure, and whilst in the interest of economy of both public and private funds laxity in advising it is to be deprecated, a well-balanced view of the subject whereby complete change from undesirable environments is secured, is both a life and money-saving measure. That a relation may exist between the mortality and the invaliding rate may well be granted; but seeing that individual discretion and idiosyncracies of medical men which influence the latter are usually the variable factors concerned, it would be impossible to deduce a law. For example, when British troops in India (1800–1856) died at the rate of 69 per mille, the invaliding rate was only 14 per mille but, in 1866–1869, when the death-rate was 29·28 (9 per mille being due to cholera), the invaliding rate was 41·5 per mille. Again, it is always possible in relation to mortality to detect a point at which a medical officer in charge of a disciplined body may have erred in reducing the admission rate; the ambition to maintain a good effective list may swell the mortality rate.

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*(Medical and Sanitary Report for 1913, p. 14.)

BOOK REVIEWS.

GHOSH (Birenda Nath) [L.M.S.] & DAS (Jahar Lal) [L.M.S.]. **A Treatise on Hygiene and Public Health with Special Reference to the Tropics.** With an Introduction by Colonel Kenneth MACLEOD [M.D., L.L.D., F.R.C.S.]–2nd edit. xvi + 394 pp. With 48 text figs. 1914. Calcutta: Hilton & Co. [Price 6*s*. net.]

As shown by the early demand for a second edition, this work has received a welcome in India where a "Sanitary awakening" has become evident, side by side with public funds rendered more accessible for its practical exhibition. Indeed, the fact that both authors are Indian graduates of the Calcutta University is of itself an earnest of that "awakening," in that the necessity for fostering it amongst their fellow countrymen has been recognised by them.

The authors state they have "in places much extended" the book. This was desirable; as the commendable wish to practice brevity left room, in the first edition, for doubt on certain points. Much of this has been duly remedied, and the value of the work has thereby been greatly increased. There still remains, however, a little leaven of the former edition. For example, omission of allusion to the existence of intermediate stages in respect to two of the parasites mentioned in the following sentence, may lead to misapprehension, having regard to restriction of consideration to the "ova" in drinking water:-"*Entozoal Disease.* Diseases due to *Distoma hepaticum, Ascaris lumbricoides, Filaria sanguinis, Ankylostoma duodenale, Oxyuris vermicularis,* etc., may be contracted by drinking water containing the ova of these parasites." This is the sole reference throughout the book to parasites of great importance in the tropics.

Brevity of description as to origin of artesian wells also is such as to leave a very incomplete impression as to the necessary physical conditions. All the information available to the reader is:—"It often happens that the subterranean water finds its way downwards, until it passes under some more impervious rock where it accumulates. If a hole be made through the upper impervious bed down to the water-charged stratum below, the water will avail itself of this artificial channel and will rise or even gush out above the ground." Similarly, in describing the Liernur system of sewage the statement that the "propulsion (sic) of sewage is effected by means of a powerful air pump from a central station," requires modification.

The chapter on food deals with the respective merits of vegetarian and mixed diet, and incidentally contrasts the diets of Europeans with those of Indians. The authors have made statements on this subject which are sound in substance, and have the particular merit of having been approached devoid of bias.

W. G. K.

SOMMERVILLE (David), [B.A., M.Sc., M.D., M.R.C.P. (Lond.), D.P.H. (Camb.), F. C.S.] **Practical Sanitary Science. A Handbook for the Public Health Laboratory.**—2nd edit. viii + 328 pp. With 79 text figs. 1914. London: Baillière, Tindall & Cox, 8 Henrietta St., Covent Garden, W.C. [Price 10/6 net.]

This volume has been a trusted guide for several years to those studying in the Public Health Laboratories of King's College and elsewhere. When therefore it appears in a second edition, and the author gives the assurance that the arrangement has been altered and considerable matter has been added, the impression derived is that an already sound work has been strengthened by the addition of all available modern material. Perusal shows this to be well justified.

Books which aspire to treatment of the chemical and bacteriological details of hygiene in aid or confirmation of deductions from sanitary surveys, ordinarily deal with reasons for appeal to laboratory tests in a separate volume. Dr. Sommerville has, however, both in the first and second edition, adhered to the system, in respect to each subject treated, of first showing why and wherefore an appeal to chemistry and bacteriology is necessary. For instance, standards for drinking water are not immediately thrust upon the notice of the student, but he has, before undertaking tests, at once explained to him the overshadowing importance of a sanitary survey in disclosing potential danger points. This spirit prevails throughout the work; to applied science is rendered homage, its abstract counterfeit has no recognition.

W. G. K.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. 5.] 1915. [No. 4.

AMOEBIASIS AND DYSENTERY.

AMOEBIASIS.

DEBONO (P. P.). **On the Occurrence of Amoebiasis in Malta.**—*Jl. of State Med.* 1914. Oct. Vol. 22. No. 10. pp. 625–629.

This is a short account of 28 cases of amoebic dysentery occurring in Malta, a locality in which, though previously suspected, it had not been proved to exist. In most of the reported cases the illness was of a severe nature, terminating in five instances in death. No exceptional features either in the biological habits of the amoebae or in the sequence of symptoms were noted. Speculating upon the various means by which the amoebae are conveyed from one person to another in a Maltese community the author was led to suspect the water cisterns of which two are generally found in each village; he found the majority of his cases were grouped round these. In view of the author's experience it is not surprising to find that abscess of the liver is by no means rare in the island, 41 cases having been recorded during the last thirteen years from the Central Hospital; both miliary, multiple and large solitary abscesses are included in this series. Though amoebae have not been found in every sample of liver pus, yet in nearly every case it was either sterile on culture or scars of ulcers were found in the intestinal canal, thus suggesting the probable amoebic nature.

P. H. Bahr.

BOERI (Giovanni). **Su di una Dissenteria Amebica Nostrale.** [On a Local Form of Amoebic Dysentery.]—*Malaria e Malat. d. Paesi Caldi.* 1914. Sept.-Dec. Vol. 5. No. 5/6. pp. 352–364.

A report of five cases of amoebic dysentery treated in the hospital at Cagliari, the point of interest being that none of the patients had lived outside the island of Sardinia prior to the supervention of symptoms. Four of the patients were middle-aged men and one a woman. Cases of amoebic dysentery of local origin have been previously reported from Sardinia by FENOGLIO, and recorded in the years 1890, 1900 and 1904; but the author thinks it important to add to their number. In one of the cases a rapid cure was effected by injections of emetin, while in another ipecacuanha was used with good effect. The remaining three cases were of a less conclusive character, there

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being some doubt as to whether the amoebae found in the stools really belonged to the *histolytica* type. In each of the cases the possibility of the dysentery being due to bacilli was excluded by the usual serum tests.

J. B. Nias.

LYNN (W. J.). **Report of an Unusual Amoebic Infection of the Genito-Urinary Tract.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1914. Sept. Vol. 2. No. 3. pp. 205-206.

This is a record, as the title implies, of a supposed infection of the urinary tract with *Entamoeba histolytica* through the introduction of a syringe, which had previously been used for rectal lavage, into the urethra. Vesical calculus was negative, though a prostatic stricture (due probably to an old gonorrhoeal infection) was found. A microscopical examination of the stools was negative as regards both amoebae and their cysts. Few details of the urinary analysis (save the occurrence of blood and pus) or of the biological characteristics of the contained amoebae are given.

[The record of this case does not bear any signs of detailed work and should be accepted with caution, as affording little proof that an obligatory intestinal parasite, such as the amoeba, is capable of flourishing and reproducing itself on the vesical mucosa.]

P. H. B.

PHILLIPS (Llewellyn). **Is Emetin sufficient to bring about a Radical Cure in Amoebiasis?** [Eighty-Second Annual Meeting of the British Medical Association. Section of Tropical Medicine.]—*Brit. Med. Jl.* 1914. Dec. 19. p. 1061.

The author, while fully recognising the beneficial effects of emetin in amoebiasis, especially in amoebic hepatitis, is inclined to think [and in this the reviewer is in agreement with him] that a prolonged course of injections is necessary in order to effect a radical cure. Emetine hydrochloride per se is very toxic to the *Entamoeba histolytica* in its vegetative stage, but the *tetragena* or cystic stage is quite refractory to this drug ; this has been shown to be the case by VEDDER. In acute dysentery and in hepatitis it is the vegetative amoebae which give rise to symptoms, while the amoebic cysts are passed via the intestinal canal only during the quiescent periods. It is therefore necessary to employ some other drug which will destroy the encysted *tetragena* stage. It has been found by UJIHARA that both thymol and male fern in doses of from 3–7 grammes respectively will kill off amoebic cysts ; salvarsan and neosalvarsan also appear to exert an inhibitive action in this respect and should be given a further trial. The author himself suggests the following line of treatment as being the one most likely to effect a radical cure :—The administration of emetine hypodermically for ten days or longer, or if the condition of the patient demand it, its oral administration as well. This is to be followed by subsequent courses, at increasing intervals, of calomel combined with thymol. No patient should be considered cured until after several examinations no cysts of *Entamoeba histolytica* are found in the faeces.

P. H. B.

KERMORGANT. **Mesures Prophylactiques prescrites par le Ministre des Colonies à l'Egard des Rapatriés d'Extrême Orient atteints Convalescents ou Suspects d'Amibiase.**—*Bull. Acad. Méd. Paris.* 1914. Séance du 14 avril. 3 ser. Vol. 71. (78e ann.) No. 15. pp. 546–547.

This short communication deals with measures recently instituted to prevent the introduction of amoebic dysentery into France by convalescents or others returning from the French colonies in the Far East. For this purpose four or five grains of emetine chlorhydrate is served out in powder form, dissolved in tincture of opium in the strength of 1 : 15. For prophylactic purposes 8-10 drops of this solution are dissolved in a cup of strong tea and given nightly. Injection of emetine by the subcutaneous route is reserved for those cases exhibiting acute symptoms, the method described above being solely for the latent cases, and for such as have diarrhoeic symptoms with or without mucous stools in which amoebae or amoebic cysts have been found. Failing a periodic microscopical examination of the stools, a regular increase or decrease of the body weight is taken as a rough index of the efficacy or otherwise of this drug.

Every ship's surgeon is directed to draw up a special report, which directly on arrival at Marseilles is forwarded to the Public Health Department.

P. H. B.

MAUREL (E.). **Contribution à l'Étude Expérimentale et Clinique du Chlorhydrate d'Émétine.**—*Arch. de Méd. Expérim. et d'Anat. Path.* 1914. May. Vol. 26. No. 3. pp. 225–250.

This paper for the most part consists of an historical retrospect of the chemical composition and therapeutic action of emetine, a subject on which in 1899 the author had commenced experiments. In 1901 and 1902 he summed up the results of his observations in seven papers submitted to the Society of Biology.

At present emetine hydrochloride has been employed therapeutically, apparently with success, in the following conditions :—

1. As a specific against the *Entamoeba histolytica.*
2. As a haemostatic in haemoptysis and oesophageal haemorrhage.
3. As a specific in hepatic congestion, in acute bronchitis and in bronchopneumonia in the aged.

The beneficial action of emetine in arresting pulmonary haemorrhage is all the more to be wondered at, seeing that experimentally in animals it has proved to have no action as a vaso-constrictor. Emetine apparently is not effective in producing the emetic or purgative action of ipecacuanha ; even in the pigeon, in which vomiting is easily produced, the dose of emetine sufficient to produce this emetic action is generally fatal.

P. H. B.

UJIHARA. **On the Amoebic Dysentery. I. Report.**—*Sei-i-Kwai Med. Jl.* 1914. Nov. 10. Vol. 33. No. 11. Whole No. 393. pp. 67–68. [The Original in No. 5. Vol. 28 of the *Jl. Tokyo Med. Assoc.*).

Ujihara formerly believed VIERECK'S *Entamoeba tetragena* to be quite distinct from SCHAUDINN'S *Entamoeba histolytica* but after further study he joined in the consensus of scientific opinion that these varieties are identical.

He found that the outer membrane of the cyst is resistant to the action of the gastric juice, but less so to the pancreatic secretion, bile and other substances which dissolve lipoids.

The cysts appear to be damaged by direct sunlight, but remain alive for months in dried faeces from which the sunlight is excluded. He found that under these conditions the cysts retained their shape and absorbed vital stains if warmed up to 50° C. daily. The specific gravity of the cyst is 1065, but how this figure is obtained is not stated. The method devised by the author for collecting the cysts is as follows: About 30 cc. of glycerin is added to 60 cc. of the filtrate, so as to make the specific gravity of the mixture as near 1070 as is possible; this is then centrifuged; to the supernatant fluid water is added till the specific gravity is about 1060 when it is centrifuged again and the sediment washed with water; the remaining precipitate is washed with dilute hydrochloric acid and numerous cysts are found in the sediment.

Quinine in combination with tannin gives therapeutically satisfactory results in amoebic dysentery and may be administered by the mouth or as an enema; thymol in combination with castor oil appears to be most effective in clearing out the cysts from the intestinal canal.

P. H. B.

DE BUYS (L. R.). **Amebic Dysentery in Children.**—*Jl. Amer. Med. Assoc.* 1914. Nov. 21. Vol. 63. No. 21. pp. 1806–1810.

This is an account of the clinical course and appropriate treatment with emetine of four cases of amoebic dysentery in white children under four years of age.

The rarity of the disease, especially in children in Louisiana, is shown from figures provided by the author. During the last eight and a half years 94,161 patients have been admitted and of these only 313 were cases of amoebic dysentery and four only occurred in children under twelve years of age.

Comparatively large doses of emetine (about grs. 1) administered by the hypodermic route were well borne and exercised the customary rapid and beneficial effect.

P. H B..

HARPUR (F. J.) & HADDAD (W. B.). **Emetine Injections in Amoebic Dysentery.** [Correspondence.]—*Lancet.* 1915. Jan. 30. p. 255.

This note records the successful treatment by hypodermic injections of emetine of outpatients in Egypt. Large doses (grs. 1) at each injection were employed and no restriction in diet could be enforced. The results were consistently good.

P. H. B.

Bréaudat (Yersin) & **Lalung-Bonnaire. La "Simaroubine" dans la Dysenterie Amibienne.**—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon* (1913). 1914. pp. 101–104.

This paper is a preliminary communication on researches on the active principles of simaruba and their action in dysentery. Powdered simaruba bark is treated in a way which is detailed and a solution is obtained, 10 cc. of which contain ·080 milligrammes of an active substance and correspond to 5 grams of the powdered bark.

This solution when injected into monkeys in a dose of 10 cc. per kilogramme body weight did not produce the least disturbance.

Following on this, seven cases of dysentery were treated with simaruba in Annam; six were in natives, one in a European; all apparently amoebic in origin. The results were highly satisfactory, though sufficient time had not elapsed to state whether relapses occurred or not.

P. H. B.

De Lanney (E. L.). **Treating Gelatin Capsules with Formaldehyde Solution for Ipecac Medication.**—*Milit. Surgeon.* 1914. Oct. Vol. 35. No. 4. p. 320.

The writer found that by soaking gelatine capsules in a 20 per cent. solution of formaldehyde and thereafter drying and filling them with 1 gramme of powdered ipecacuanha powder he was able to obtain good results in the treatment of amoebic dysentery cases in which the plain gelatin capsules had failed to effect a cure. Latterly he has had good results from a combined treatment of ipecacuanha enclosed in these capsules together with emetine injections.

P. H. B.

Niles (George M.). **Some Remarks on the Treatment of Amoebic Dysentery.**—*Amer. Jl. Med. Sci.* 1914. Oct. Vol. 148. No. 4. [No. 511]. pp. 526–530.

With reference to emetine the author records his belief that small doses do not satisfactorily eradicate the amoebae, but that maximum doses, 2 or 3 grains, should always be given, if tolerated by the patient.

A new method of treatment, namely, the injection of kerosene oil, is recommended. For an adult about one pint of pure oil should be employed and, with the patient in the knee-elbow position, should be introduced by means of a colon tube. The oil should be retained for 30 to 40 minutes before being allowed to escape. This injection should be repeated daily for three or four days and then occasionally as required.

P. H. B.

Wick. Uzara bei Amöbendysenterie.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. July. Vol. 18. No. 14. pp. 490–493. With 2 curves.

Uzara is a native medicine made from the roots of a herb growing in the region of the African great lakes. The author was first stimulated to give the drug in tabloid form a trial (quantity not stated) after the publication of successful cures in amoebic dysentery by WALDOW and GÜHNE (May 1912, *Archiv. f. Schiffs- u. Tropen-Hygiene*). The present paper deals with but two cases of amoebic dysentery in which the results were so marked and rapid as to be worthy of publication.

[In the two cases the patients' temperature and number of stools rapidly fell to normal, but it is doubtful whether equally good results could not easily be obtained with the old fashioned ipecacuanha treatment, and certainly with the more modern injections of emetine.]

P. H. B.

BAETJER (Walter Albert) & SELLARDS (Andrew Watson). **The Behaviour of Amoebic Dysentery in Lower Animals and the Bearing upon the Interpretation of the Clinical Symptoms of the Disease in Man.**—*Bull. Johns Hopkins Hosp.* 1914. Aug. Vol. 25. No. 282. pp. 237–241.

This paper contains a considerable amount of information which has been since incorporated in the longer and more explicit communication on the whole subject of amoebic dysentery summarised below. The main points in this preliminary paper are as follows :—

The clinical course of amoebic dysentery in cats corresponds closely to the typical clinical picture of the disease as it occurs in man ; even the acute and chronic stages and carriers of the infection are produced in these animals. No experimental evidence was obtained suggesting the occurrence of an intestinal amoebic infection without the production at the same time of the symptoms of dysentery.

Amoebae recovered from atypical clinical cases of amoebic dysentery in man reproduce the same atypical symptoms when injected into cats.

A new point the authors appear to have brought out is that guinea-pigs are susceptible to infection, but that these rodents are quite unsuitable for study on account of the atypical course the disease runs in them and their extreme susceptibility to secondary bacterial infection ; in fact bacterial septicaemia was the cause of death in the majority of the infected cats and it is suggested that a similar process occurs in fatal cases of amoebic dysentery in man.

P. H. B.

SELLARDS (Andrew Watson) & BAETJER (Walter Albert). **The Propagation of Amoebic Dysentery in Animals and the Recognition and Reproduction in Animals of Atypical Forms of the Disease.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1914. Oct. Vol. 2. No. 4. pp. 231–245.

The attempts of various authors to secure the propagation of dysentery through a series of animals having failed, even under the most favourable conditions, the authors utilized a method of direct inoculation into the lumen of the bowel. A small incision is made in the abdomen in the mid line, exposing the caecum. A syringe needle of moderate bore is inserted at an angle into the lumen of the bowel so as to form a valve and the material containing amoebae injected. After the needle is withdrawn the puncture wound may be cauterized or the serosa sutured over it, should there be any tendency to leakage.

After a few subinoculations in kittens the amoebae apparently increase in virulence, so that infection by intrarectal injection becomes more certain of success. By the intracaecal route 100 per cent. of the inoculated animals became infected. For this several explanations are advanced: in the first place the necessity of employing diluting agents is avoided, and secondly the material is injected directly against the bowel mucosa. Moreover, the general anæsthesia required probably prevents the prompt expulsion of the material introduced.

No evidence was obtained that by scarifying the mucosa with a syringe needle the amoebae are enabled to gain entrance to the bowel wall and reproduce their typical lesions.

During the last year, by using this method combined with injections by rectal tube, the authors have been able to transmit the infection through eleven successive generations in cats without finding evidence of either decrease in virulence or morphological changes in the amoebae, provided that these are obtained from the site of active lesions. The material used was obtained from a patient who had contracted the disease three years before in the Philippines and had had several courses of emetine treatment. The first inoculation was made with material obtained during a typical acute exacerbation and after the patient had received 2–3 grains of emetine hypodermically for three days. It was found essential, in order to obtain favourable results, to select material at the first onset of symptoms when the dejecta consisted almost entirely of blood and mucus and abounded in active trophozoites. Kittens one half grown or younger were found to be the most susceptible, adult cats being distinctly resistant to infection. Considerable difficulty was experienced on account of the increasing virulence of the accompanying bacteria; after the third or fourth transfers this became so marked that it was at times practically impossible to avoid creating a general peritonitis.

The dysentery induced by these means was uniformly fatal in the young animals and the incubation period showed marked constancy in the earlier, but became definitely shorter in the fifth and sixth passages. In the animals which died a septicaemia due to a streptococcus was almost invariably found. In these cases the amoebae in the intestine were found to degenerate rapidly and often failed to infect, even when injected into animals immediately post mortem.

Morphologically the typical organisms obtained from the stools at the onset of symptoms or from the site of the active lesions at autopsy showed no diminution in size, nor loss of mobility nor degenerative changes.

With the exception of a few of the rarer complications, such as brain and splenic abscess, all of the conditions occurring in man are also found in experimental animals.

In the majority of the younger animals the disease manifested itself as a typical acute infection ending in death at an early date without cessation of the acute dysenteric symptoms. In other cases, especially in adult animals, chronic infections with typical remissions and periods of acute relapse occurred. Many of these cases terminated in recovery and one animal became a carrier of infection. One chronically infected animal developed a large hepatic abscess which contained no pus, but merely soft necrotic tissue abounding in active amoebae. From a study of the terminal septicaemia, to which reference has been made, it seems probable that a similar process occurs as a terminal event in man, as is suggested by the large number of positive cultures obtained by STRONG from various organs studied at autopsy.

No experimental evidence was found to support the view that extensive lesions of the intestine are able to develop without dysenteric symptoms.

Several atypical strains and their effect on inoculation were studied. These were derived from cases showing a mild, but continuous diarrhoea in the stools of which was contained scanty amoebae atypical in that they were smaller in size, in possessing nuclei rich in chromatin and in their resistance to emetin medication, but which produced dysenteric symptoms and lesions in animals. More surprising still is the fact that in one instance at least the disease in the kitten partook of the same clinical manifestations—a chronic diarrhoea with continuous watery discharge—as in the patient from whom the material was originally obtained. The authors conclude that possibly these amoebae either are a separate species or have been much modified both in their morphological and pathological properties by a long continued existence under unfavourable conditions in the human host.

[It need hardly be added that this, coming from such a source, is an extremely valuable paper and should be studied in the original by all interested in the subject.]

P. H. B.

SELLARDS (Andrew Watson) & BAETJER (Walter Albert). **The Experimental Production of Amoebic Dysentery by Direct Inoculation into the Caecum.**—*Bull. Johns Hopkins Hosp.* 1914. Nov. Vol. 25. No. 285. pp. 323–328.

This paper deals more fully with the method of intracaecal injection of amoebic dysentery material. At first the authors attempted to obtain better results than were possible by the intrarectal injection method by introducing the entamoebae under the uninjured mucosa of the intestine; it was found, however, that the majority of adult cats treated in this manner died from septicaemia, while monkeys failed to become infected at all. The authors then developed the idea of inoculating the material directly into the caecum. After the laparotomy a syringe is filled with the material to be inoculated before being connected with the needle. A moderately large puncture wound can be made in the gut, the syringe needle withdrawn and the peritoneum closed without further precautions and it is not necessary to comminute larger flakes of blood and mucus in order to facilitate introduction.

In the cat injections were made as a routine measure into the caecum on the supposition that the entire large bowel was susceptible to infection as in man; it was subsequently found, however, that the seat of election in these animals is the lower part of the rectum. The regularity with which the lesions appeared in this part of the bowel after inoculation through the caecum is strong proof in favour of the penetration of *E. histolytica* through the uninjured mucosa ; injury of the bowel wall by scarification or by other means invariably failed to produce infection at the site of injury. The success of these intracaecal inoculations made possible the testing of a variety of strains of amoebae from widely separated geographical areas. With the exception of those animals which died from secondary causes, there were no instances of amoebae failing to infect, which is all the more remarkable since some of the patients from whom the material was derived did not show at the time any of the characteristic symptoms of dysentery.

The authors consider that this method will be extensively used in the diagnosis of amoebic enteritis in those cases in which the amoebae are extremely scarce or their morphology is quite atypical. With a more certain method for producing infection in animals it will be possible to study aberrant forms and to test experimentally whether some of the amoebae which are supposed to be morphologically constant may not really be subject to variation.

P. H. B.

MARSHALL (Alexander). **A Simple Method of Staining the Amoebae Parasitic in Man.**—*Laboratory Jl.* 1914. Sept. pp. 1.

The author, working in Khartoum, uses the following technique :—

"1. Make smears from dysenteric stools and without allowing them to dry transfer rapidly to Schaudinn's fixing fluid [sublimate-alcohol].
"2. Wash in graded alcohols and finally in distilled water.
"3. Stain with Ehrlich's haematoxylin for 20 minutes.
"4. Wash with tap water.
"5. Stain with carbol fuchsin as for tubercle bacilli.
"6. Wash with tap water.
"7. Differentiate thoroughly with Sprengle's picric acid solution (absolute alcohol and saturated aqueous solution of picric acid in equal parts).
"This solution is to be applied from three to five minutes, during which it should be changed three or four times.
"8. Dehydrate with absolute alcohol, clear in xylol and mount in Canada balsam."

"The nuclei of the parasite assumed a purplish-black hue and stood out from the surrounding cytoplasm, which acquired a pale translucent yellowish tint. The nuclear structure of the cells was clearly and sharply defined. Red blood corpuscles were stained a light yellowish colour."

H. B. Fantham.

CRAIG (Charles F.). **Observations upon the Morphology, Life-Cycle and Relation to Disease of** ***Entamoeba histolytica***.—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1914. Sept. Vol. 2. No. 3. pp. 169–184. With 2 plates.

This paper contains a summary of recent knowledge of *Entamoeba histolytica* Schaudinn, 1903, emend. Walker, 1911. The subject has been reviewed many times in this *Bulletin* recently. However, a few interesting points may be noted or emphasised.

The author insists on the important fact that the morphology of the amoeba varies greatly at different stages in its life-cycle. The cycle may be divided into three periods, the trophic, pre-cystic and cystic. These are then discussed separately, as seen in living and in stained preparations. In the living condition the cysts of *E. histolytica* vary from 10μ to 20μ in diameter, the cyst wall is delicate and hyaline, having a single outline in the younger cysts and a double outline in the older ones. Reference is made to the important work of WALKER and SELLARDS (1913), summarised in this *Bulletin* (Vol. 3, p. 63), on the proof of the pathogenic nature of the entamoeba by producing amoebic dysentery experimentally in man. Cysts are the infective agents, and prophylaxis of the disease rests upon the discovery of "carriers" of the cysts. "A routine microscopical examination of the faeces should be as much a part of a clinical examination as the use of the stethoscope, the clinical thermometer, or the examination of the blood or urine."

The paper is illustrated by two plates of photomicrographs containing 13 figures.

H. B. F.

GAUDUCHEAU (A.). **Etude Comparative d'une Amibe de Culture et de Quelques Autres Formes Amibiennes Végétatives.**—*Bull. Soc. Méd. Chirurg. de l'Indochine.* 1914. July. Vol. 5. No. 7. pp. 293–304. With 1 plate.

The author considers that *Entamoeba phagocytoides* is a cultural amoeba. It was isolated by him in 1907 from dysenteric intestinal material. He has not yet seen in cultures a flagellate stage (see this *Bulletin*, Vol. 3, p. 78), and its generic name must be considered to be provisional. The amoeba adapts itself slowly at first to life in cultures. Modifications in the culture medium produce morphological variations in the amoeba. The cultural amoeba easily digests red blood corpuscles. It multiplies by budding under certain conditions. When the culture medium is nearly used up there is aggregation of the amoebae. These characteristics suggest that the organism is possibly a Myxomycetes. The spirilla threads previously seen in *E. phagocytoides* are identified as large flagella from bacteria in process of digestion. Some of the observed forms are intermediate between those of a strict Entamoeba and a cultural *limax*-like amoeba. In no case could the observed intermediate forms be considered to be degenerate. Foldings in the peripheral cytoplasm were sometimes seen suggesting transition between a pseudopodium and an undulating membrane. The author considers that members of the genus *Vahlkampfia* (cultural amoebae) can also live in the digestive tract and so are facultative parasites. He thinks that bacteria are the hosts of cultural amoebae, while red blood corpuscles, intestinal epithelium and liver are the hosts of Entamoebae.

In conclusion the author endeavours to show the relations which appear to exist between cultural amoebae and dysenteric amoebae on the one hand, and the Myxomycetes (Mycetozoa) on the other. There is a plate of 22 figures.

H. B. F.

SWELLENGREBEL (N. H.). **Dierlijke Entamoeben uit Deli (met Autoreferaat).** [Animal Entamoebae at Deli.]—*Geneesk. Tijdschr. v. Nederl. Indië.* 1914. Vol. 54. No. 4. pp. 420–426. With 1 plate.

The author, working at Medan, Deli, examined the faeces of an ape, *Macacus rhesus*, and of a sheep for entamoebae, and describes a new species from each.

Entamoeba chattoni is parasitic in the gut of *Macacus rhesus*. The amoeboid forms varied between 13μ × 12μ and 12μ × 9 μ, the cysts being 9μ or 8μ in diameter. Uninucleate and binucleate cysts only were found. They contained a glycogen vacuole.

Entamoeba ovis, from the gut of the sheep, was found as amoeboid forms varying between 14μ × 12μ and 12μ × 11μ, and as uninucleate cysts, which contain extra-nuclear chromatin and a glycogen vacuole. The cysts are 8μ in diameter.

These points are illustrated in a plate of 31 figures.

H. B. F.

SMITH (Allen J.) & WEIDMAN (F. D.). **Further Note upon the Occurrence of *Endamoeba mortinatalium* as a Human Parasite.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1914. Oct. Vol. 2. No. 4. pp. 256–259. With 1 plate.

The authors first found *Endamoeba mortinatalium* in 1910 in the kidneys, liver and lungs of a still-born foetus at term. Similar amoebae had been seen twenty years previously by RIBBERT in the kidneys of a syphilitic new-born infant and twice later in the parotid glands of non-syphilitic infants, and by JESIONEK and KIOLEMENGOLOU (1904) in the kidneys, liver and lungs of a syphilitic eight-months foetus.

In the material found by the authors in Philadelphia in 1910 the largest Endamoebae measured 38μ by 25μ, while the smallest were 22μ in diameter. Vacuoles were present. Pseudopodia, few in number, were short and thick. The pseudopodia were composed of ectoplasm, and there was a coarsely granular endoplasm. The nucleus was large, measuring one third to one half the diameter of the cell. It was rich in chromatin, containing a large karyosome and occasionally a centriole. There was a well-defined nuclear membrane. No associated bacteria were demonstrable.

Recently the organism has been found again in the lungs of a two-months old female child in the Philadelphia General Hospital. The child was syphilitic, and died from pneumonia.

"The pneumonia was of a peculiar type ; the right lung being uniformly over the greater part of the whole organ consolidated and pale in a thin subpleural layer, while the central portion was deep red fleshy and nearly solid. Microscopically the red interior presented an irregular consolidation, with the vesicular walls thick from injection of their capillaries, marked cellular infiltration and swelling of the lining cells. Scattered vesicles were free from exudate and a number were filled with a highly albuminous fluid exudate which had been fixed as a hyaline content. For the most part, however, the vesicles contained, along with a minor amount of fibrin, a mixture of erythrocytes, a few polynuclear and mononuclear leaucocytes and many larger cells of embryonal connective tissue type. Mingled with these here and there the parasites were met, never in aggregations, and only sparsely scattered throughout the section. In the pale subpleural pneumonic area organization was advancing, the connective tissue cells appearing as fibroblasts: and an excess of formed fibrous tissue was to be seen. Several small caseous foci in this area were found, never with the histology of definite tubercles; and special stains for tubercle bacilli failed to show the latter organisms. No other morphological changes, aside from widespread parenchymatous degeneration, were met; the intestines were normal to gross inspection."

It is considered that "it may be possible that a syphilitic infection may constitute a favouring circumference [*sic*] for infestment by these amoebae and their development and distribution in the body."

The plate represents a photomicrograph of a section of pulmonary tissue containing an *Endamoeba mortinatalium* 32μ by 20μ, with a nucleus of 10μ.

[An organism called *Amoeba pulmonalis* was found by ARTAULT in 1898 in the contents of a lung cavity. This parasite is not mentioned by Smith and Weidman. A detailed comparison of the forms would be interesting, if it were possible.]

H. B. F.

MATHIS (C.). **Réflexions sur Six Cas d'Hépatite Suppurée observés à l'Hôpital Militaire de Hanoï.** [Clinique d'Outre Mer].—*Ann. d'Hyg. et Méd. Colon.* 1914. Apr.-May-June. Vol. 17. No. 2. pp. 616–618.

Abscess of the liver is of frequent occurrence in Tonkin. In five months the author had six cases under his care. In five of these a dysenteric history was obtained and in the liver pus of all amoebae could be demonstrated. Attempts at cultivation of these organisms in sterile pus completely failed. A leucocytosis with diminution in the number of eosinophiles was found to be a constant feature. This reduction the author believes to be actual and, therefore, a characteristic and diagnostic feature of amoebic abscess.

P. H. B.

SAMBUC (Edouard). **La Pleurésie au Cours de l'Hépatite Suppurée.**—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon.* (1913). 1914. pp. 64–71.

The anastomoses of the lymphatic vessels between the pleura and the liver (especially on the right side) are responsible for the frequency of pleurisy in hepatic abscess.

As regards the pathogeny, the author considers these pleurisies classifiable according as they are the result of direct extension or metastatic in origin. Pleuritic effusions by direct extension were met with five times in 191 autopsies, but minor inflammatory conditions of the pleura (metastatic) were commoner, 15 per cent. in 100 clinical cases. In the former instance an empyema is the result of a direct perforation of the diaphragm, the bases of the lungs and the upper surface of the liver being matted together in a necrotic mass; on the other hand purulent pleuritic effusions found at autopsy without involvement of the diaphragm are very rare. An illustrative autopsy which came under the author's observation is given.

Large purulent effusions may occur and the hepatic abscess remain undetected or unsuspected during life; post-mortem a small communication may be found through the diaphragm. An example of this nature is given where the right pleura was entirely filled with purulent matter. In the majority of cases the empyema is localised and shut off by adhesions in the neighbourhood of the base of the right lung. A pericardial effusion was found in 14 per cent. of autopsies for hepatic abscess.

Clinically these pleurisies may appear early or late in the course of the illness. Symptoms, such as a reappearance of fever or the occurrence of dyspnoea, should make the physician suspicious of some complication of the pleura. Finally it is of great importance that the pleura should be carefully watched after an operation for hepatic abscess, especially if the abscess was subphrenic. P. H. B.

MAURRAS & HERVIER. **Sur l'Anesthésie Locale Systématique dans les Opérations pour Hépatite Suppurée.**—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon.* (1913). 1914. pp. 106–110.

This paper contains a summary of the cases of hepatic abscess operated on at the Military Hospital, Saigon, during 1913 under local novocaine or stovaine anaesthesia. Out of thirteen cases (see MARTEL's paper below) nine, or 69 per cent., completely recovered. The authors make no pretence to have inaugurated this method, as it had been previously mentioned in the writings of BERTRAND and FONTAN. They employ a solution of 1 in 100 to which an addition of adrenalin, 1 : 1000, can be made if required. This is given hypodermically, but should resection of a rib be considered necessary a second injection must be made deep into the intercostal muscles and also under the periosteum.

Should a median or paramedian laparotomy be undertaken for an abscess pointing in the epigastric triangle, the liver can easily be exposed after a superficial and deep local anaesthesia has been effected; an interval of five minutes is allowed to elapse for the anaesthetic to take effect.

In hepatic abscess local anaesthesia has several advantages over general; the patients in this condition nearly always take a general anaesthetic badly and delayed chloroform poisoning is apt to occur. Besides, the authors think that even a moderate degree of chloroform poisoning acts as depressant and naturally decreases the resistant power of the body in lessening or absorbing the products of suppuration. If the local anacthesia has been well performed no part of the operation is attended by intolerable pain; the only part felt by the patient is the digital exploration of the abscess. Another objection which can be advanced is that local anaethesia limits the freedom of action on the part of the surgeon; the authors of this paper, on the contrary, have never felt any restrictions of this sort. In the series under consideration there were only two cases where the subsequent administration of chloroform became necessary. In the first case the patient refused local anaesthesia and in the second a too extensive operation had to be performed which would have necessitated the injection of too large a quantity of novocaine. Cases of hepatic abscess in the same hospital, which were operated on under general anaesthesia, only gave 60 per cent. of recoveries as against 69 per cent. of those operated on under a local anaesthetic.

Of the four fatal cases recorded, in three the abscesses were small and multiple, while the fourth was complicated by tubercular peritonitis. P. H. B.

LE ROY DES BARRES. **Notes sur un Point de Technique Opératoire dans l'Ouverture des Abcès du Foie par Voie Transpleurale.**—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon.* (1913). 1914. pp. 105–106.

In a great number of cases, in the absence of any recent pleuritic adhesions, the transpleural operation for abscess of the liver is complicated by the creation of a pneumothorax, to avoid which it is usual to suture in an elliptical manner the pleura to the diaphragm. This preliminary suturing is not always easy to carry out, besides which the pleurae are very apt to tear. The author has found it much more advantageous to suture the membranes after the incision of the pleurae and diaphragm has been made. In order to do so two Kocher's clamps are placed on each side of the future incision, so as to embrace the pleurae and the diaphragm at the same time and an incision is rapidly made in a line joining the two clamps. The tissues on each side of these clamps can then be easily sutured with catgut. By these means one saves a great deal of time and only a negligible quantity of air can enter the pleural cavity.

It is advisable to resect a considerable length of rib, taking care to cover the resected portions with muscular tissue, so as to protect the bare bone from coming into contact with the pus and thus producing an intractable osteitis.

P. H. B.

MARTEL. **Emploi de l'Emétine à l'Hôpital Principal de Saigon. Sa Valeur Curative dans les Congestions du Foie et les Hépatites Suppurées d'Origine Dysentérique.**—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon.* (1913). 1914. pp. 31–43.

Emetine has been used therapeutically in dysenteric conditions in Saigon hospital since April, 1913. This communication deals with its effects in hepatic congestion and hepatic abscess, especially after operation. The results were specially encouraging in cases of hepatitis suggesting a commencing suppuration.

Emetine was given in doses of 6, 8 and 10 centigrammes over a period of six to ten days; under its influence the clinical symptoms ameliorated and the leucocyte count rapidly became normal.

A clinical record of eight cases is given to illustrate the author's contentions. His estimation of the value of emetine in post-operative treatment is based on thirteen cases, nine of which were completely cured and four died. These nine successful cases encourage the author n the belief that eight centigrammes of emetine given daily over a period of eight to fifteen days exert a very favourable action, hasten the cicatrization of the abscess and its final cure, and improve the patient's general condition; at the same time one cannot deny that fresh hepatic abscesses sometimes form while the patient is under the influence of the drug; this occurred in two of his cases.

The percentage of successful cures of cases operated on for hepatic abscess in Saigon varies very much from year to year; during 1913 69 per cent. of a series of thirteen cases were cured; this is the highest percentage of recoveries and the smallest total number of cases recorded since 1906. The author wonders whether this beneficial result is entirely due to emetine.

P. H. B.

BACILLARY DYSENTERY.

DENIER. La Dysenterie à Saigon.—*Far East. Assoc. Trop. Med. C. R. Trois Congrès Biennal. Saigon.* (1913). 1914. pp. 25–31.

The dysentery stools passed in the military hospital at Saigon were systematically examined at the local Pasteur Institute during the year 1914; the present paper deals with the results. By these means the author was able to demonstrate that bacillary dysentery is widely spread and to determine at what season of the year the disease was most prevalent. A detailed statement of the technique employed in the investigation of the stools is given, as the author considers that in order to make just comparison with the results of others it is essential to utilise similar methods. It is as follows:—

Directly a patient suffering from any intestinal complaint is admitted to the military hospital the Pasteur Institute is advised by telephone; thereupon a sterilised receptacle for the stool is immediately despatched. The examination of the stool is commenced within 30 minutes of its being passed. In addition to the microscopical examination of the fresh specimen several smears of the mucus are fixed by the Bouin-Dubosc method and stained with haematoxylin.

For the isolation of the dysentery bacillus the Conradi-Drigalski medium has been found unsatisfactory. For various reasons the author reverted to plain litmus lactose agar and was able to obtain more satisfactory results. Colonies of bacilli which retain a blue colour after 36 hours of incubation are selected, inoculated into broth and into a peptone-water solution of the various sugars and finally agglutinated against antisera prepared by injections of rabbits with killed cultures of Shiga-Kruse, Flexner, "Saigon," and Strong's dysentery bacilli obtained from the stock cultures of the Pasteur Institute in Paris. The litmus media were prepared throughout with the kahlbaum tincture.

Observation conducted on these lines commenced on the 28th of May and terminated on the 31st of October, though interrupted for one month (from the 24th of August to the 22nd of September) on account of the shortage of the various sugars employed.

During the year dysentery in Saigon itself was of a very benign type, though much more virulent at Cape Saint Jacques during the months of May and June. No fewer than 329 stools were examined during the period under review. Dysentery of bacillary origin was found to be of most frequent occurrence during the months of June and July. Out of the total number of dysenteric motions bacilli were isolated in 30·48 per cent. and from diarrhoeic stools in 17·72 per cent. Bacilli and amoebae were frequently found associated. Of the classifiable varieties of specific bacilli Shiga bacillus was obtained in 37·68 per cent., Flexner in 11·59 per cent., bacillus of Hiss in 23·18 per cent. and "Saigon" in 27·52 per cent. The several varieties of dysentery bacilli were isolated on some occasions from the same stool.

P. H. B.

HEFFERNAN (P.). Asylum Dysentery.—*Indian Med. Gaz.* 1914. Nov. Vol. 49. No. 11. pp. 417–424.

Bacillary dysentery has proved to be the scourge of lunatic asylums in India, as indeed has long been the case in similar institutions in

Europe. At the outset of this paper the author, who is Superintendent of the Madras Lunatic Asylum, gives certain pertinent statistics as to the prevalence of this disease in certain of the newly designed asylums of India, where no suspicion of the sanitation or of the water supply can possibly be entertained. The continued existence and spread of the infection can only be explained by the supposition that certain individuals act as carriers of the infection. Dysentery accounted for 11·96 per cent. of the total deaths in the lunatic asylums of Bengal during 1912. The questions the author touches on in his paper are the following :—

"(1) Is asylum dysentery in India identical with the bacillary dysentery of the English asylums, and if the diseases are not identical, in what does the difference consist ?

"(2) By what measures may we hope permanently to eradicate the disease from the Indian and English asylums ?

"(3) What is the best treatment for individual cases of the disease, in India and in England, with which we are acquainted ? "

The author endeavours to answer these questions by means of a brief analysis of the dysentery cases which have occurred in the Madras Asylum during the past three and a half years. The incidence rate was calculated according to the method employed by Dr. Sidney COUPLAND, that is, the percentage of attacks in proportion to the average number resident during the year.

According to this method there were 197 attacks of dysentery during the forty-four months under review and the yearly rate works out at 9·5 per cent. of the daily average number of patients resident. The mortality amongst those attacked was 19·8 per cent. The longest stay of any patient in hospital was 128 days, the shortest one day. The stools were examined microscopically in every case, and the bacilli were isolated at the King Institute of Preventive Medicine, Guindy, where autogenous and polyvalent vaccines were prepared.

It was found quite impossible to isolate dysentery bacilli from faeculent stools, but only from the freshly passed mucus. Bacilli were isolated in this manner in 50 per cent. of the total number of cases.

Experience suggests to the author that the isolation of dysentery bacilli from the stool is of little value in the diagnosis of the disease, as if the stools are kept for any considerable time before plating, or if anything but well washed and freshly passed mucus is used, a negative result may be expected.

As regards the diagnosis, the author considers that acute cases with fever lasting about three days in individuals who have not previously suffered from dysentery are almost certainly bacillary, and the success or failure of emetine treatment is of little use from a diagnostic point of view except in cases where the ordinary forms of treatment have been tried and have failed and where emetine succeeds. The *Amoeba histolytica* was present only in five cases ; of these, three were Europeans and one an Indian lately returned from Singapore. Three cases in whose stools *Balantidium coli* were present proved rapidly fatal.

Prophylactic measures against this type of dysentery consisted of :—

(1) The treatment of all dysentery cases in isolation sheds.

(2) The segregation and observation of convalescents for six months after recovery. . . .

(3) The incineration of the excreta of all dysentery patients and of convalescents.

(4) The boiling of drinking water.

(5) Prophylactic inoculation of all patients exposed to infection.

Of these the last measure calls for special attention. Prophylactic inoculation was commenced in November and December, 1913, when 533 patients were inoculated, the vaccine being prepared from Shiga and Flexner strains isolated from the stools of previous cases. The emulsion was made up to a strength of 100 million dead bacilli per cc. Two inoculations of 200 millions each were administered at a 10–14 days interval. The consequent reaction was extremely slight and occurred chiefly in individuals who had previously suffered from dysentery. In six cases a localised and sterile tissue necrosis occurred. The results of this inoculation during 1913 from the prophylactic point of view have been disappointing.

The pathology of this asylum dysentery is dealt with in a summary of 1,167 post-mortems made during the period under review. In 20·4 per cent. dysenteric lesions of the bowel were present, in 15 tubercular ulcers, but in no single instance were liver abscesses present.

Medicinal treatment consisted in the administration by the mouth of ʒss-ʒi of castor oil, together with boric acid, albargin (grs. 4 to the pint) and potassium permanganate rectal lavage; it was found advisable to leave the solutions in the bowel as long as possible, for which purpose the foot of the bed should be raised on blocks 18 inches high.

Serum treatment was tried with encouraging results in a limited number of cases, so far with good results. The impression left as a result of this trial is that serum is of benefit in acute febrile cases, but that its effects are transient and that several doses are required to produce any permanent effect on the disease; the great expense of the serum practically rules it out in asylum practice as a routine measure. An interesting point and one worthy of serious study and investigation is the observation that many of the Madras cases developed glossitis or stomatitis during the course of their illness. The stools became frothy, copious and very offensive– in fact very like those of sprue. At the post-mortem examination in these cases there was great attenuation of the alimentary canal and denudation of epithelium.

Inoculation as a therapeutic measure with polyvalent or autogenous vaccine was tried in 1911 in 37 cases, but the results were not encouraging, though one must note that the most unfavourable cases were the subjects.

The paper closes with a reference to the difficulties in the prophylaxis of dysentery which a superintendent of such an asylum has naturally to contend against amongst unclean and insane natives. At the conclusion of the paper there are appendices containing statistics to which frequent reference is made in the text.

P. H. B.

KUENEN (W. A.). La Dysenterie Bacillaire chez les Coolies à Deli.— *Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon.* (1913). 1914. pp. 54–62.

The mortality rate of dysentery in Deli (Sumatra) has considerably decreased during the last ten years. In 1901 it was computed to be

50 per cent., while during the last few years it has oscillated round the figure of 10 per cent. Of this death-rate the amoebic variety appears to be responsible for about four-fifths. According to Drs. SCHUEFFNER and BAERMANN bacillary dysentery appears to have been imported from Java and to have spread in epidemic form. The figures for about 10,000 coolies are as follows:—

In	1909	Deaths	149.	Amoebic	Dysentery	28.	Bacillary	Dysentery	21
„	1910	„	121	„	„	10	„	„	14
„	1911	„	167	„	„	16	„	„	36
„	1912	„	109	„	„	11	(Shiga's bacillus 1 Y bacillus 10)		13
„	1913	„	120	„	„	9	(Shiga's bacillus 2 Y bacillus 21)		24

Under the heading of *bacillary dysentery* are included all cases showing a diffuse inflammation of the intestinal canal in which amoebae are not present. For isolation of the specific bacillus the author uses a medium called Endo coloured by fuchsine, on which the *coli* colonies take on a bright red colour. He considers that various micrococci and colon bacilli as well as Cercomonads and Trichomonads may play a part in the pathology of the disease.

According to the author's ideas, as well as those of LEVY, KOLLE and HETSCH, it is necessary to separate the disease caused by the Shiga-Kruse bacillus from other dysenteries. There are valid reasons for this separation—bacteriological, clinical and epidemiological.

The Shiga-Kruse bacillus is found throughout the whole world; it gives certain definite sugar reactions and in broth produces a toxin which has a definite specific action on experimental animals. It produces in man the disease known as epidemic dysentery. The *pseudo-dysentery* bacilli acidify maltose and mannite in addition to glucose, though there are intermediate types; for instance, one has been isolated ten times during the last four years which acidifies maltose and glucose but not mannite, and agglutinates only slightly with Shiga-Kruse and "Y bacillus" immune serum, while agglutinating in high dilutions with its own immune serum. This new type the author has called "Van der Bosch." None of the pseudo-dysentery bacilli form toxin in broth as does the Shiga-Kruse bacillus. The number of pseudo-dysentery bacilli can be augmented almost indefinitely. Type "Y" ferments mannite alone; type Flexner, mannite and maltose—or maltose alone (type "Van der Bosch").

According to the author's experience sub-varieties of pseudo-dysentery bacilli are of little significance. The fermentative powers of even the same strain of bacillus are extremely variable. If a colony of bacillus "Y" is plated out, bacilli can be isolated which ferment maltose only with difficulty and even some which give the reactions of the true Flexner.

The clinical symptoms evolved in man by bacilli of the pseudo-dysentery group are certainly less severe than those of epidemic dysentery, but nevertheless they cause a high percentage of deaths in Deli; for instance, in 1913, 20 per cent. of the total number due to bacillary dysentery.

As regards the pathological lesions caused by these types of bacilli no appreciable differences can be detected. As regards treatment the author considers that the antitoxic serum exerts often a remarkable action in epidemic dysentery, but it should be given as early as possible, that is to say before a diphtheroid membrane has formed, extensive enough to endanger the life of the patient.

The serum prepared in the pathological laboratory at Medan by injecting a horse with Shiga-Kruse bacilli has remarkable bactericidal properties and appears to act equally well in cases of pseudo-dysentery.

P. H. B.

De Sautelle (W. T.). **A Case of Bacillus Dysenteriae Septicemia.** *Jl. Amer. Med. Assoc.* 1914. Nov. 21. Vol· 63. No. 21. p. 1853.

Instances of the isolation of *B. dysenteriae* from the blood during life have seldom been recorded; therefore the case described in this paper is of exceptional interest.

The patient was a three-weeks-old breast-fed infant with a temperature of 103°. There was no diarrhoea, but meningeal symptoms were present. From blood extracted from the toe, as well as from a lumbar puncture, *B. dysenteriae* was isolated in pure culture. Previous to this a tentative diagnosis of typhoid fever had naturally been made from the fact that the grandmother of the infant was suffering in the same house from *B. typhosus* septicaemia.

The reactions given by this dysentery organism differed in minor details only from the typical Flexner bacillus.

The source of infection could not be ascertained.

P. H. B.

Musgrave (W. E.) & Sison (A. G.). **Bacillary Dysentery: the most Prevalent Form in Manila and its Treatment.**—*Philippine Jl. of Sci.*, Sect. B. Trop. Med. 1914. June. Vol. 9. No. 3. pp. 241–251.

During the past decade it has been conclusively shown that the dysentery group of organisms is world wide in its distribution, though the types of bacilli and the clinical varieties of the disease they give rise to in different localities appear to vary considerably.

In the Philippine Islands bacillary dysentery is endemic at all times and is due to at least three types of the organism—the well known types of Shiga and Flexner and the lesser known type of Morgan, which appears to have been the predominating cause of the recent epidemic in the Islands, though in and about Manila, where the cases were more scattered, organisms of the Shiga and Flexner types were found.

During the year 1912–1913 there came under the notice of the authors 266 cases of acute colitis, of which 191 were in males and 75 in females; both the case incidence (67 cases) and the mortality rate (9 per cent.) were found to be highest during the first five years of life. The average death rate from this cause, as compared with statistics given for other countries, appears to be extremely low. In the majority of cases (61·6 per cent.) the colitis was associated with other diseases, such as pulmonary tuberculosis (18 cases) and worm infections, such as *Ascaris lumbricoides* and *Trichuris trichiura*.

Complications, though not all due to the influence of the dysentery bacillus, were found in 30·1 per cent. of the cases; these ranged from acute nephritis (13·9 per cent.) to acute splenitis (0·4 per cent.).

The prophylaxis of bacillary dysentery is referred to in general terms; it is interesting to note that flies are considered to be the main disseminators of the disease in the Philippines. The routine treatment in the Philippine General Hospital is as follows:—Some mild laxative, preferably sodium or magnesium sulphate, is administered early and is preceded by minute doses of calomel, while *Simaruba officinalis* combined with some opiate is highly recommended and is considered to have given the most satisfactory results in comparison with other drugs. As an adjuvant normal saline enemata, and later when the acute stage has subsided, similar injections of hydrogen peroxide in a weak solution (25 cc. in 500 cc. water) are considered advisable. The use of ipecacuanha even when combined with opium in the form of Dover's powder or that of the usual astringents and gastro-intestinal antiseptics, such as bismuth, tannic acid, salol, and betanaphthol is not recommended. The essential part of the treatment is considered to be the dietetic; during the first acute stages food must be withdrawn and pieces of crushed ice given to allay the thirst. It is essential that the mouth be frequently cleansed with an antiseptic mouth wash to prevent the complications of parotitis and gastritis.

It is noteworthy that for practical purposes, in places where the means of identifying the infecting micro-organisms are not available, treatment by polyvalent serum fails. This experience of the authors, which is entirely opposed to that of other investigators of the disease, is ascribed to the important rôle played by other micro-organisms, such as staphylococci and colon bacilli, in producing the inflammation of the intestinal mucosa.

P. H. B.

CANDIDO (G.). **Piocianasi Dissenterica.** [Dysentery due to *B. pyocyaneus*].—*Ann. Med. Nav. e Colon.* 1914. Oct.-Nov. Ann. 20. Vol. 2. No. 4-5. pp. 337-351. With 1 chart & 4 figs.

An account of a case of dysentery in which *B. pyocyaneus* was recovered in pure culture from the stools.

The patient was a sailor belonging to the Italian Navy, who entered the naval hospital at Taranto for the purpose of having a routine examination made of his stools for cholera vibrios, on his return from foreign service. For one or two days previous to entering the hospital the patient had stayed at an inn where he had partaken of oysters. On entering the hospital the bowels were normal, but on the fourth day the patient was seized with sudden colic and diarrhoea, together with a rise of temperature. The stools, which were very frequent and passed involuntarily, consisted of a greenish liquid mixed with mucus and blood. There was much loss of strength and great emaciation. The patient recovered after an illness of 40 days' duration, the temperature coming down to normal on the 12th day. *B. pyocyaneus* was recovered in a state of purity from the stools, and was easily identified by cultural and other tests. Some general observations, and a bibliography of the condition, are appended. The oysters are suspected to have been the cause of infection.

J. B. N.

FLAGELLATE DYSENTERY.

ESCOMEL (E.). Un Nouveau Traitement de la Trichomoniase Intestinale.—*Bull. Soc. Path. Exot.* 1914. Nov. Vol. 7. No. 8–9. pp. 657–660.

The author writes from Arequipa, Peru, regarding his treatment of intestinal trichomoniasis, of lambliasis and of amoebiasis.

(1) He recommends for trichomoniasis the use of an aqueous solution of iodine, 1 per 1,000, as an enema. The water used for solution need not be boiled, as a moment after the addition of the iodine it becomes sterile.

The enemata should be given slowly each evening for three consecutive days, using one litre each time. Before the iodine enema, one of boiled water should be given. The patient should be placed on a farinaceous diet, with rice water for drinking.

Usually the Trichomonas disappear from the stools on the second day of treatment, and the cysts on the third day. If, as in rare cases, Trichomonas are still found in the stools on the fourth day, it indicates that the Protozoa have invaded the deeper and higher zones of the intestinal mucosa. In such cases it is necessary to apply the following treatment.

Emulsion de Franck*	120 gm.
Elixir parégorique	4 à 6 gm.
Essence de térébenthine	2 à 4 gm.
Julep gommeux	30 gm.

A spoonful of the mixture every two hours for the first three days.

And morning and evening :—(1) An enema of 2 litres of decoction of eucalytpus ; (2) a second enema of 60 gm. of boiled water, yolk of an egg, 10 drops of laudanum and 15 drops of essence of turpentine. Rest, an exclusive carbohydrate diet, and warm fomentations on the stomach. The treatment is to be continued until no stages of tricho-

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*The prescription has been thus transcribed by Mr. P. H. MARSDEN, Lecturer in Materia Medica and Pharmacy, in the University of Liverpool, into a form which may be readily prepared by a British pharmacist:—

Julepo do Dr. Franck	Infusi Cinchonae (1 in 50, not acid)	72 grams.
	Extracti Cinchonae	11 „
	Tincturae Cinnamomi	20 „
	Syrupi Opii (0·5 Ext. in 1,000)	14 „
Tincturae Camphorae Compositae		5 „
Olei Terebinthinae		3 „
Potion gommeuse vel Julep gommeux	Gummi Acaciae	2 „
	Aquae Floris Aurantii	2 „
	Aquae Destillatae	20 „
	Syrupi	6 „
	Mistura fiat	

The dose would be probably a tablespoonful, the common French dose for mixtures.

monas occur in the stools. [Compare this *Bulletin,* Vol. 4, p. 317 and Vol. 1, p. 719]:—

(2) For patients affected with *Lamblia intestinalis* he recommends:—On the first day a milk diet (3 to 4 litres of milk); on the second day 0·4 to 0·6 cgm. of calomel after fasting, and half an hour afterwards 45 gm. of aromatic castor oil. Strict milk diet. On the third day the parasites should have disappeared.

(3) For intestinal amoebiasis the author uses injections of emetine until all stages of the amoebae have disappeared from the stools. Hepatic amoebiasis is common at Arequipa, with or without previous dysentery, due to the daily taking of much spice (capsicum) with the food. Congestion of the rectum and liver is thus produced which is favourable to the development of ingested amoebae. From the rectum the amoebae may penetrate the veins and reach the portal system. ROGERS's treatment, namely, repeated injections of emetine and puncture of the liver abscess, has given good results.

H. B. F.

WRIGHT (J. M.). **Balantidium coli.**—*China Med. Jl.* 1914. July. Vol. 28. No. 4. pp. 259–260.

This short paper begins with a description of the Ciliate, *Balantidium coli,* and continues with quotations from BRAUN, DANIELS, STITT and MANSON on its occurrence and pathogenicity.

The author, writing from Takhing, China, states that he has found the parasites in apparently healthy individuals. In no case could the infection be blamed for any of the symptoms. The parasites have been kept alive in infected fecal specimens for 10 to 94 days.

The author concludes that "if there exists a disease of the lower bowel, one can easily imagine harm that they (the Balantidia) might do."

H. B. F.

MIXED AND UNCLASSED DYSENTERY.

SANDWITH (F. M.). **The Lettsomian Lectures on Dysentery. Delivered before the Medical Society of London, 1914. Lecture I. The History of Dysentery. Lecture II (Part I). Amoebic Dysentery. Lecture II (Part II). Diagnosis of Amoebic Dysentery. Lecture III. Bacillary Dysentery.**—*Lancet.* 1914. Sept. 5. pp. 637–642; Sept. 12, pp. 683–687; Sept. 19, pp. 731–736; Sept. 26, pp. 783–789.

These lectures, written as they are in a bright and scholarly style, certainly constitute one of the fullest accounts of the history, etiology and treatment of dysentery which has appeared of recent years. It is difficult on that account, and also since they contain little in the way of experimental work which has not been printed elsewhere, to compose an adequate review of them in a short space.

The first lecture consists of a resumé of the history of dysentery, especially with reference to the knowledge gained in the last thirty-three years, that is since Sir Joseph FAYRER delivered the Lettsomian lectures on the same subject. The first part of the second lecture deals with the life history and morphology of the Entamoebae found in man and in this connection full credit is given to WALKER and SELLARDS for their recent work, in which by means of experiments on human beings they showed conclusively that the encysted forms of the two human entamoebae are the infective agents, and that while one is pathogenic, the other is harmless to man [see this *Bulletin*, Vol 3, p. 63].

In the diagnosis of amoebic dysentery Dr. Sandwith lays stress on the necessity of examining the stools daily for amoebae and the inadvisability of relying upon one negative examination. He considers that no naked eye examination of the faeces can be trusted to determine whether the patient is suffering from amoebic or bacillary dysentery, although he thinks a shrewd guess may be made in this direction: in amoebic cases the mucus is generally of a deep red colour, purulent and not unlike the liver pus.

The importance of washing stools to ascertain the presence of sloughs or masses of mucus, a method much neglected in English hospital practice, is commented upon.

The second part of the second lecture is mainly concerned with the treatment of amoebic dysentery and contains a concise and practical account of the history of treatment both by emetine and by ipecacuanha. Here the suggestion is made of serving out as a routine measure emetine tabloids to plantation coolies who are attacked by diarrhoea or dysentery—a valuable practice which should be universally adopted.

That emetine is not always successful in saving the lives of amoebic dysentery patients is shown by the case of a Japanese fireman under Dr. Sandwith's care who died after comparatively large doses of the drug and after a twelve days' stay in hospital. As a subsidiary agent Dr. Sandwith is a great believer in bismuth, given as a subnitrate in doses of from fifteen to sixty grains four-hourly.

The third lecture deals entirely with bacillary dysentery and considerable space is allotted to the discussion of asylum dysentery, which by the figures given appears to be still alarmingly frequent in the lunatic asylums of this country and which Dr. Sandwith considers is of bacillary origin. In the paragraph on treatment due attention is given to the injection of a polyvalent antiserum especially in heroic doses.

P. H. B.

SCOTT (L. Bodley). **The Nature of Jail Dysentery.**—*Indian Med. Gaz.* 1914. July. Vol. 49. No. 7. pp. 269–270.

The Sylhet jail, like many other jails in Bengal and Assam, regularly has a high admission rate for dysentery. Facilities for bacteriological tests not being available, it was decided to apply the test of treatment in order to settle whether the dysentery of the jail was amoebic or bacillary in nature. In April, 1913, a dysentery register was opened and all prisoners admitted to hospital for this disease were entered in the book as they came. Without selection of any sort alternate cases on the list were treated with hypodermic injections of emetine, the remainder by the older methods such as ipecacuanha (grs. 20 to 40), sodium sulphate (1 drachm every three hours), while a few received samples of some new drugs—*Ixora cocci* or an extract of *Holorrhena liquidum* which had been sent for trial by the Indigenous Drug Committee. In the register were recorded over a period of ten months the treatment of each case and other details such as the number of days in hospital, the number of daily stools, etc. Of 254 cases eight died, giving a mortality of 3·15 per cent. From the tables as compiled there were found to be no very striking differences between the results obtained from the various drugs, though there was a slight balance in favour of the saline treatment. The main point is that emetine gave no better results than other forms of treatment, thereby suggesting that the type of dysentery under observation in this jail was not of amoebic origin.

[The experience of the author of the paper, though his conclusions were obtained by a rather crude method, the therapeutic test, seems to agree with that of other investigators on epidemic dysentery in native jails, which is nearly always of bacillary origin, the amoebic cases being rarer and of a more sporadic occurrence.]

P. H. B.

GRALL (J.) & HORNUS (P.). **Coprologie des Dysenteries, Diagnostic Différentiel Macroscopique.**—*Paris Med.* 1913–14. June 13. Vol. 4. No. 28. pp. 51–58.

The observations on which the paper is based were made in the Military Hospital at Casablanca, where the authors have had the opportunity of studying from day to day numerous bacillary and amoebic dysenteric stools.

As a routine measure every patient exhibiting dysenteric symptoms was first put to bed and placed on a milk diet; then by means of a special apparatus placed in the latrines the stools were collected quite free of and uncontaminated by urine and were afterwards examined microscopically; in addition the agglutinative powers of the serum were tested against a suspension both of Shiga's and of Flexner's bacilli.

In this manner 465 patients were duly examined. Of these 86 stools could not be classified, 32 were diarrhoea of dysenteric origin, while 104 contained amoebae and from 234 dysentery bacilli were isolated; of the bacillary cases three quarters were due to Shiga's, the remaining one quarter to Flexner's dysentery bacillus. Observation showed that all stools of a dysentery nature passed through two stages (*a*) a sero-mucous and (*b*) a faecal stage, and that furthermore the mucus passed per rectum could be classified according to its consistency and colouration. The green colour of the mucus in all cases would appear to be due to the presence of unconverted biliverdin, but when dyed with red or pink the colour is due to the presence of red blood corpuscles.

The authors find that the mucus from amoebic cases had distinctive characteristics; it is white and glairy, like the white of an unboiled egg, streaked with blood, contrasting with the green bile-stained mucus, and often swimming in a yellow serous fluid.

As a result of their work they have been enabled to draw up a rational classification of dysentery and its varieties as follows :—

	Green mucus with aggregations of bacteria.	Superficial catarrhal inflammation of the ileocaecal region by pathogenic micro-organisms.	**Dysenteric diarrhoea.**
	Red mucus with aggregations of leucocytes.	Necrotic ulceration of the sigmo rectal tract by the dysentery bacilli.	**Bacillary dysentery.**
Mucus partly red and partly green.	The red elements extremely rich in masses of leucocytes.	Catarrhal inflammation and ulceration of the ileocaecal region by the dysentery bacilli and usual organisms.	
	The red elements enclosing scattered masses resembling pus.	Catarrhal inflammation and ulceration of the ileocaecal region by the action of microorganisms and pathogenic amoebae.	**Amoebic dysentery.**

To sum up, the macroscopic examination of the dysenteric mucus is a very rapid and simple procedure, and it is the authors' contention that by the light of their investigations it is a valuable indication as to the nature or the seat of the dysenteric process.

[The macroscopic appearance of a dysenteric motion is apt to be influenced by so many factors—i.e., nature of the food, age, race of patient, the length of time since passed, etc.—that undoubtedly the majority of investigators are able to place little reliance on it as an aid to diagnosis.]

P. H. B.

Denier. **Etat des Malades atteints d'une Affection Intestinale, dont les Selles ont été examinés à l'Institut Pasteur de Saïgon pendant les Mois d'Octobre et Novembre 1913.**—*Ann. d'Hyg. et Méd. Colon.* [Clinique d'Outre Mer]. 1914. Apr.-May-June. Vol. 17. No. 2. pp. 585–588.

This paper consists merely of tabulated returns of microscopical laboratory examination of stools during the months of October and November, 1913. The stools are classified according to whether they consisted mostly of mucoid or faeculent matter.

In October, 1913, in mucous stools amoebae were found in 60·86 per cent., dysentery bacilli in 8·69 per cent., while a negative result was recorded in 30·43 per cent.; in the faeculent stools on the other hand 27·77 per cent. were found to contain amoebae, and 11·11 per cent. dysentery bacilli. The month of November, 1913, showed a higher proportion of bacillary cases: in the mucoid stools bacilli were found in 13·04 per cent., amoebae in 47·82 (a slightly lower proportion than in October). Of the faeculent stools 18·18 per cent. contained amoebae and 9·09 per cent. dysentery bacilli. [See also this *Bulletin*, Vol. 3, p. 46].

P. H. B.

HEBBERT (R. F.). **The Treatment of Dysentery.** [Correspondence].
—*Indian Med. Gaz.* 1914. Sept. Vol. 49. No. 9. pp. 371–372.

Captain Hebbert's experience of the treatment of dysentery in India would appear to be an exceptional one. In his hands the pure magnesium sulphate treatment has proved very successful but not in every instance; in some it appeared to produce a severe spasm of the iliac colon, the occurrence of which he seems to have avoided by the administration of 30 minims of camphorodyne at night, followed by a drachm of magnesium sulphate given hourly during the day time. With this routine he has failed in two cases only to get rid of all blood and mucus from the stools in under the week.

It is surprising that contrary to the experience of Indian practitioners in general he has so little faith in ipecacuanha and considers a negative examination of the stools as far as amoebae are concerned of little value. He is of the opinion that when the colon is very acutely inflamed, perhaps from some local ulcer, a severe spasm ensues which prevents the complete flushing of the large intestine. This, he thinks, is to a large extent prevented by the camphorodyne.

P. H. B.

SPRUE.

Distaso (A.). Sur l'Etiologie de la Sprue.—*Bull. Soc. Path. Exot.* 1914. Apr. Vol. 7. No. 4. pp. 268–270.

A bacteriological examination of the stools of a patient suffering from sprue showed on Drigalski's medium scanty colonies of *Bacillus coli* and a large number of colonies belonging to the *Lactis aerogenes* and Friedlander's bacillus group. The members of the latter group produced acid and gas in glucose, lactose, mannite, raffinose and levulose, but had no action on saccharose, dulcite and salicine. They had no motility and they produced acid and gas in neutral red agar while indol appeared in a tryptophane medium. A vaccine was prepared from this organism and an injection was given to the patient, followed by another seven days later. After this the symptoms of the disease disappeared, diarrhoea giving way to constipation. Up to the time of writing there had been no relapse and the author believes that the case is completely cured. He draws attention to the fact that with the amelioration of the symptoms the flora of the intestine took on the aspect of that of a normal individual. He proposes to name the bacillus the *Bacillus spruae.*

[One should like some more details as to the colour and other aspects of the faeces and the general condition of the patient before coming to the conclusion that this was really a case of cure.]

G. C. Low.

Ashford (Bailey K.). Clinical Notes on a Case of Sprue. -*Bol. Assoc. Méd. de Puerto Rico.* 1914. May. Vol. 10. No. 98. pp. 10–12.

This is a well-written and particularly well expressed account of a case of sprue occurring in an American gentleman in Porto Rico. The shining tongue and distended abdomen, the large, evil smelling, grey or amber coloured stools left the diagnosis hardly in doubt.

An experimental trial of emetine hydrochloride by subcutaneous injection proved to be a failure, nausea was thereby induced and its administration had to be discontinued. Next an attempt was made with tincture of nux vomica on the lines laid down by Carnegie Brown, combined with gambir-agar to combat the atrophic enteritis. Under this treatment improvement was noted, but one night without any previous warning a severe gastric haemorrhage occurred, although no sign or syndrome of gastric ulcer had ever presented itself and the gastric juice had been proved to be almost entirely deficient in hydrochloric acid. After this occurrence the patient was placed on a strict milk diet with ever increasing quantities of fresh strawberries which had to be secured from the United States (his monthly diet costing him over $130). Beginning with 2,000 grammes of milk a day he reached in a period of three weeks a total quantity of 4,000 grammes.

A decided improvement manifested itself almost immediately, so fresh vegetables and fruit, especially the pawpaw, were added. In two months he had sufficiently recovered to enable him to take up his heavy official duties.

P. H. B.

WILLIAMS (C. E.). **A Case of Sprue.**—*Med. Jl. of Australia.* 1914. Nov. 28. Vol. 1. No. 22. pp. 519–520.

This is a record of sprue occurring in a sugar planter, aged 56, in Queensland. There was nothing remarkable about the appearances and clinical symptoms of what appeared to be a typical case. On a purely milk diet, increasing to as much as seven or eight pints of milk per diem, together with juice of pears, grapes, oranges, and mangoes, especially the latter, great improvement and a corresponding increase in the body weight of the patient took place. Within a period of four months a total increase of 51 pounds was registered. After six weeks' treatment other ingredients, such as custard, baked apple, beef tea, and soft milk pudding were added to the diet. No medicines were given, save an occasional dose of castor oil and 3 minims of cinnamon oil in gelatin capsules as a carminative and intestinal antiseptic.

[The main interest is the record of an authentic case from Queensland where, according to the author, the disease appears to be not uncommon, though as he remarks it is less often recognised in patients who, having previously resided in the north, develop symptoms in the southern states.]

At the end of the paper the author makes some very pertinent remarks as to the management of a case of sprue; he says, and very wisely too, that experience has taught him never to undertake the treatment of a case of sprue except in a hospital, or if in a private house then only with the help of a trained nurse who has full charge of the patient. There is no absolute rule as to the dieting of cases; as to the exact quantity and nature of the food individual experience alone can tell; any article of diet which disagrees must immediately be stopped. Personal supervision of the diet is the main and most vital part of the treatment; written instructions are worse than useless and all drugs quite ineffective. He remarks a trait of sprue patients with which every practitioner who has seen several cases is familiar, namely, the readiness with which they religiously follow their instructions in regard to medicines, which are at the best but placebos, but disregard entirely instructions as to diet, a very important and to them a vital matter.

Of the fruits available the author is inclined to recommend the strawberry and the mango as being the most suitable, as well as the most efficacious. Finally, when the patient is living on a liberal diet, it is most necessary, in order to prevent recurrence of symptoms, to omit those articles of diet which are usually recognised as being indigestible, such as pastry, pork, pickles, meat twice cooked, etc. As regards the etiology of sprue the author has little to say, save that in Queensland the cases seem to originate chiefly in two or three centres. It is fairly prevalent, though not to such an extent as in districts further north. He thinks that the nature of the dietary or of the water supply has little to do with the causation or spread of the disease, the symptoms of which suggest some alteration of the intestinal flora with a consequent catarrh of the mucous membranes, a denudation of the epithelium and of the glandular and other structures, and finally toxaemia from the absorption of the intestinal products of fermentation leading to anaemia and pigmentation comparable to what obtains according to LANE's theory of intestinal stasis.

[It is to be noted that Williams expresses views similar to those of the reviewer, who has incriminated, though not actually convicted, some species of yeast fungus (Monilia) as being the organism mainly concerned in the production of this excessive intestinal fermentation.]

P. H. B.

HIATT (H. B.) & ALLAN (W.). **Notes on Cases of Sprue invalided from the Tropics; will it become Endemic here?**—*Jl. Amer. Med. Assoc.* 1914. Aug. 1. Vol. 63. No. 5. pp. 395–397.

The authors fear that the recent American invasion of Porto Rico, an island where sprue is very prevalent, and the numbers of American residents who have returned home after contracting the disease may —should sprue be, as the authors suspect, an infectious disease—lead to its dissemination throughout the Southern States. As evidence of the contention they point to the rapid spread of pellagra in these states during recent years.

They base their description of sprue, which does not differ from the very familiar text book accounts, on three cases from Porto Rico, two from China, and one case in a white woman, a resident since birth in North Carolina, which from their description of clinical symptoms appears to be a typical instance of the disease.

Having had a large experience of pellagra they are quite unable to support the contention of STUART, BURNET, JACKSON and others that pellagra and sprue are virtually one and the same disease.

P. H. B.

ROGERS (Leonard). **Two Cases of Sprue treated by Mouth Streptococcal Vaccines and Emetine Hydrochloride hypodermically.** - *Lancet.* 1914. June 6. pp. 1605–1606.

This paper concerns itself with a clinical record of two cases of undoubted sprue in females (one in a Mahommedan); in both the symptoms had persisted for several years before they came under observation. The improvement on hypodermic injection of emetine in half-grain doses, increased subsequently to one grain on alternate days, was marked; the stools became less frequent and of a better consistency and colour. Cultures made from the mouth lesions gave a pure growth of streptococci, which were injected as a vaccine in doses of from 50 to 100 millions once a week. The mouth and bowel symptoms rapidly improved. Both patients are said to have been free from symptoms for as much as two months and to have regained some of their lost weight, though this does not appear from the text to have been actually recorded. The author does not look upon emetine in any way as specific in sprue, but is inclined to attribute to it some undefined virtue. The success attending the use of the streptococcal vaccines, he considers, opens up the interesting and suggestive question as to the rôle played by this organism in the disease, at least in some cases.

[The virtue claimed for emetine in sprue is opposed to the experience of the reviewer. Little can be said in support of the streptococcal origin of the disease. The *Streptococcus salivarius*, as is well known, is present in almost every saliva and, according to the reviewer's work, is also present in all buccal ulcerations whether associated with sprue or not. The absolute impossibility of avoiding extraneous organisms in such a septic cavity as the mouth renders the recognition of the organism involved an especially difficult one.]

P. H. B.

SCHMITTER (Ferdinand). **Sprue treated by Emetin Hydrochlorid.**—*Jl. Amer. Med. Assoc.* 1915. Jan. 2. Vol. 64. No. 1. p. 53.

The author reports a case of sprue in which a remarkable improvement took place after the administration of emetine hydrochloride when all other treatments had been tried in vain; this improvement the author is anxious to ascribe to the drug. His experience of the case confirms what he had previously noted and reported (this *Bulletin*, Vol. 4, p. 12) in six other cases. In the present case the patient, a man of 40 years of age, gained 71 pounds in weight and completely reacquired the sexual powers which he had previously lost.

P. H. B.

CASTELLANI (Aldo). **Notes on the Hyphomycetes found in Sprue; with Remarks on the Classification of Fungi of the Genus "Monilia Gmelin 1791."**—*Jl. Trop. Med. & Hyg.* 1914. Oct. 15. Vol 17. No. 20. pp. 305–310. With 6 figs.

This is practically the same paper as the one reviewed in this *Bulletin*, Vol. 4, p. 533; in effect it creates a number of new species of yeasts belonging to the genus *Monilia*, of which *M. albicans*, the thrush fungus, is the best known example. It is obvious that the preparation of this paper has entailed a great deal of labour, while it is difficult to understand its ultimate object in view of the extreme variability and pleomorphism which these yeasts exhibit, seen in the fact that authors as yet do not appear to be generally agreed upon the typical cultural reactions, or even the method of reproduction, of the type of the genus, *Monilia albicans*. Anyone who has worked out the sugar reactions of different bacilli realizes how variable in minor details they are liable to be. Much more is this the case when one is dealing with a group possessing such marked fermentative powers as the yeasts; it therefore would appear to be rather premature to create and name as new species strains or varieties of these yeasts on such slender characteristics as the formation of a slight amount, or of a very slight amount of gas from a solution of a certain sugar, more especially when the exact strength of the solution, composition of the medium, the temperature, and the period over which the incubation is performed are not specifically stated, for it is well known that the sugar reactions differ slightly from day to day; nor is one informed of any standard whereby "a slight amount of gas" may be distinguished from "a very slight amount," or even a "slight decolorization" of peptonized milk from a "very slight decolorization" of the same medium. It is difficult to comprehend the aim and object of this laborious investigation, in which the author concludes by stating that "in practically every case of sprue it is possible to put in evidence fungi microscopically or culturally" when in a joint paper with Dr. G. C. Low (1913) (see this *Bulletin*, Vol. 1, p. 725) he stated that yeasts play but a subsidiary part in the etiology of sprue.

On the basis of classification adopted by Dr. Castellani it would be possible to write a volume on the varieties of *Bacillus coli* (as differentiated by sugar reactions) and other organisms found in the normal human intestine, and in describing a species—*Monilia faecalis*—isolated from a sputum "collected from a dirty receptacle," Dr. Castellani exhibits a curious disregard for the niceties of bacteriological technique. The multiplication of species of yeasts on what appear to be such inadequate grounds only tends to obscure what is already a sufficiently difficult subject.

P. H. B.

RELAPSING FEVER.

Bisset (E.). Relapsing Fever in the Meerut Division.—*Proc. Third All-India Sanitary Conference held at Lucknow, Jan. 19-27, 1914. Vol. 4. Papers.* Suppl. to *Indian Jl. Med. Research.* pp. 114–119.

The author has investigated the part taken by lice in the spread of relapsing fever in the Meerut Division. Of 663 lice, caught on patients suffering from the disease, and carefully dissected and examined, 26·3 per cent. were found to contain spirochaetes. Of 100 lice caught in uninfected villages, none showed the presence of any of these parasites. The spirochaetes were found only in the stomach and coelomic fluid. The salivary glands, ovaries, testicles, Malpighian tubules, and eggs before and after being laid, were all examined with negative results. On three occasions spirochaetes were found in the faeces from an infected louse. The author dissected batches of lice which had been removed from patients and kept without food for periods varying from one to six days, and found that the percentage of those containing spirochaetes was always much about the same, though rarely those that had been starved 5 to 6 days showed spirochaetes in enormous numbers or in tangled masses. Lice collected from convalescents of 10 and 14 days were never infected, whilst some collected six days after the infection still contained spirochaetes.

Various attempts were made to convey the disease to animals. Highly infected lice were fed daily on the shaved abdomen of a monkey; the droppings of 20 to 25 infected lice were mixed with saline and well rubbed into the excoriated abdomen of a second monkey; the coelomic fluid of infected lice was mixed with saline solution and inoculated four times at intervals of a week into a young rat; the coelomic fluid of infected lice was inoculated three times into a chicken at intervals of one week. In every case negative results were obtained.

Finally the author adds some notes on the epidemiology of the disease. With regard to seasonal prevalence the infection was widely spread in the cold weather of 1911–12; it commenced to die down in April and no village was freshly infected after March. In December the disease again appeared in epidemic form and the earliest authentic cases occurred in the latter half of September. It is evident, therefore, that the disease is especially prevalent during the cold season.

All castes may suffer but the vast majority of cases occur among the low and dirty classes. The disease is confined to families, or occupants of the same courtyard, and one can always trace the source of infection in any village. In every locality where cases occurred lice were found in abundance, and there is no other biting insect sufficiently common to account for the great prevalence of the disease.

The author states that the mortality among men is apparently higher than among women. The actual mortality varies considerably, for in one village there were 13 cases with five deaths, whilst in another there were 22 cases without a single death. The great majority of the deaths are caused by exhaustion, especially due to the fact that it is a common belief that a case of fever must be starved.

As a preventive measure it is obvious that there must be a crusade against lice and these insects may easily be killed by exposing any infected clothing to the sun for a few hours.

Finally there is no doubt that the mortality can be very much reduced, if the people can be persuaded to feed their sick, but after the crisis, when the patient often becomes ravenously hungry, it is important that suitable food should be given, or a fatal attack of diarrhoea or dysentery is very liable to ensue.

E. Hindle.

VASSAL (J. J.). **Une Epidémie de Fièvre Récurrente au Tonkin.**—*Far East. Assoc. Trop. Med. C. R. Trois Congrès Biennal, Saigon* (1913). 1914. pp. 296-308.

In 1912 the author observed an epidemic of relapsing fever in the Tonkin province of Kien-An. During this epidemic in 15 villages there were 703 cases of which 339 were fatal, giving a mortality of 48 per cent.

The epidemiology of the disease confirms the view that transmission is effected by means of body-lice, for it is prevalent during the cold season from January or February until June, months during which lice are especially abundant and when the natives herd together, thus offering ideal conditions for the passage of these parasites from one person to another.

The typho-bilious form of the disease was common and in general the main symptoms noted during the epidemic differed in many points from the classic descriptions. Complications were not uncommon and included modifications of the blood (such as anaemia), acute mania, noma, abortion, etc. Relapsing fever in Tonkin has been mistaken for malaria, cholera, plague, typhoid, etc., and is often very difficult to diagnose clinically. The aid of the microscope is indispensable and as the spirochaetes stain very easily they can be detected without much difficulty. Subcutaneous injections of atoxyl were employed in the treatment of 157 cases, and favourably influenced the course of the disease. In 195 cases salvarsan was administered intravenously. The average dose employed was 0·1 gm. for children and 0·25 gm. for adults. In all cases wonderful results were obtained, for after a violent reaction the fever disappeared and the patient recovered. Occasionally relapses occurred but spirochaetes could never be detected in the blood.

Salvarsan sterilizes the carriers of infection and therefore is of great utility in preventing the spread of epidemics. In Tonkin relapsing fever seems to be spreading and therefore it is very important that the disease should be carefully watched and all cases at once sterilized by the use of this medicament.

E. H.

SOMALILAND. **Report [on Outbreak of Relapsing Fever among Camel Constabulary]** by DRAKE-BROCKMAN (R.E.), Medical Officer in Charge of Troops. -Received in Colonial Office 4th February 1915.

In three letters the author adds further notes on relapsing fever in Somaliland [see this *Bulletin*, Vol. 3, p. 4]. The disease seems to have recently extended its range in this region for, with the exception of the coast town of Bulhar, where an epidemic broke out a few years ago, the fever was not known to exist in British Somaliland.

On the return of a company of the Camel Constabulary from Hargeisa to Galoleh a large percentage of the men reported sick and no less than 13 per cent. suffered from relapsing fever at the same time. Although the mortality is slight the patients are often one or two months on the sick list, and therefore its incapacitating power is very considerable. It is uncertain whether the disease has spread from Bulhar to Hargeisa or vice versa, but in the latter case it must have come across Africa. The author records the presence of the transmitting host *Ornithodorus savignyi* at Burao, Ber, and Ged Aboukr on the Arori Plain, in addition to Hargeisa and Bulhar. Up to the present no cases of relapsing fever have been observed in Burao, the military headquarters, but as the tick is known to exist there, special precautions are advisable to prevent the infection being introduced. *Ornithodorus savignyi* is invariably found in dirty and unsanitary surroundings where men and animals congregate, such as in the soil about camping grounds of long standing, under shady trees, and around wells where animals are watered. They bite both men and animals but are not known to convey any parasite harmful to the latter. There is great danger of the ticks being spread by animals after having been watered, for the author on one occasion observed several ticks on the legs of his pony and they were obviously biting him as the animal kept on stamping his feet.

In addition the author records the presence of malignant tertian malaria at Burao. The disease was introduced by members of the Camel Constabulary, after they had visited the Tug Wagali on the borders of British and Abyssinian Somaliland. The disease has not spread owing to the absence of mosquitoes.

E. H.

DUMOLARD (Léon), AUBRY (Georges) & TORRE (Mme). **Les Troubles Psychiques du Typhus Récurrent. (Note Préliminaire.)**—*Rev. Méd. d'Alger*. 1914. May. Vol. 2. pp. 257–259.

The authors have observed various cases of relapsing fever in the hospital at Mustapha, Algeria, and note the frequency of psychic symptoms. Thus out of 17 patients, 14 were affected in this manner. Eleven times there was mental confusion with delirium, and three times simple mental confusion.

These psychic troubles are generally only transient, occurring at the crisis of the first attack; they are rarely present in the relapses. Meningeal symptoms were sometimes observed, but were much less common than psychic troubles.

E. H.

KASSIMATIS (K.). ΚΑΣΣΙΜΑΤΗ (Κ.). *Περὶ τῆς ἐπιδημίας τοῦ ὑποστροφου πυρετοῦ ἐν τῷ "Ελληνικῷ στρατῷ κατὰ τὴν Ἠπειρωτικὴν ἐκστρατείαν.* [On an Epidemic of Relapsing Fever in the Greek Army during the Campaign in Epirus].—„Ιατρικη Προόδος." 1914. Nov. 1 & 15. Vol. 19. Nos. 21 & 22. pp. 396–401.

In a paper read before a congress of Greek practitioners at Alexandria, the author gives an account of an epidemic of relapsing fever which broke out in the Greek army during the recent military operations.

The disease was first observed in troops returning from Macedonia in the month of December, 1912, and was undoubtedly contracted from the Turks, relapsing fever being known to be endemic in the Turkish territories bordering upon the Black Sea. As many as 700 cases were observed in one division of 10,000 men. Intravenous injection of neo-salvarsan, in doses of 0·6 gm., was the only treatment which gave a satisfactory result.

J. B. Nias.

PRINKOS (N. B.). ΠΡΙΓΚΟΥ (Ν. Β.). *Περὶ τῆς κατὰ τὴν ἐκστρατείαν Ἠπείρου καὶ Μακεδονίας ἐπιδημίας τοῦ ὑποστρόφου πυρετοῦ καὶ τῆς θεραπείας αὐτοῦ.* [On the Epidemic of Relapsing Fever in the Campaign of Epirus and Macedonia and its Treatment.]—„Ἀρχεῖα Ἰατρικῆς.“ 1914. Sept. 1–20. Ser. 3. Vol. 9. Nos. 25–27. pp. 246–250. With 3 charts.

The author had the opportunity of studying 250 cases of relapsing fever in one of the Greek military hospitals in the month of January, 1913. Of this number 107 were treated with doses of neosalvarsan, in doses ranging from 0·3 to 0·6 gm., with very satisfactory results. A single dose of 0·6 gm., injected hypodermically in the middle of an access of fever, sufficed in every case to bring down the temperature to normal within 24 hours, and prevented, as far as could be ascertained, all further relapses. Two temperature charts are given, showing complete apyrexia for periods of 21 days after the administration of a single injection.

J. B. N.

NICOLLE (C.) & BLANC (G.). **Les Spirilles de la Fièvre Récurrente sont-ils Virulents aux Phases Successives de leur Évolution chez le Pou? Demonstration de leur Virulence à un Stade Invisible.**—*C. R. Acad. Sci.* 1914. June 15. Vol. 158 No. 24. pp. 1815–1817.

When the North African relapsing fever spirochaetes are ingested by a louse, they rapidly disappear from the body of the insect. About eight days later they reappear in the form of very thin active individuals which soon attain the dimensions of the blood forms. Some days later they again disappear, this time finally.

The authors have injected monkeys with lice taken at varying intervals after an infected meal in order to see whether the spirochaetes were virulent even though their presence could not be detected microscopically. The results were as follows :—

From the 1st to the 4th day no spirochaetes were visible in the lice and the louse contents were not virulent ; on the 5th and 6th days the spirochaetes were still invisible but virulent ; from the 7th to the 9th days slender spirochaetes appeared which were virulent ; on the 10th and following days adult spirochaetes appeared which were non-virulent ; after the 19th day spirochaetes disappeared.

The spirochaetes, therefore, are more especially virulent during the phase immediately preceding, and the first stages after, their re appearance.

The lice used in these experiments were fed twice daily on a human subject who was bitten 9,000 times by infected lice in 1913, and 6,500 times in 1912. In all, this man was bitten 15,500 times by infected lice without any effect and yet when one of these lice was crushed and its contents placed on his conjunctiva the man developed a typical attack of relapsing fever. This experiment is a further proof of the usual method of infection in this disease.

E. H.

NICOLLE (Charles) & BLANC (Georges). **Etudes sur la Fièvre Récurrente poursuivies à l'Institut Pasteur de Tunis. Deuxième Mémoire (1914).**—*Arch. Inst. Pasteur Tunis.* 1914. Dec. 1. Vol. 9. No. 2. pp. 69–83.

The present article is merely a more detailed account of the results published in the preceding paper, together with a summary of Ed. SERGENT and FOLEY's article on the same subject.

The authors' conclusions, drawn from both series of experiments, are as follows :—

1. In lice fed on infected blood the spirochaetes disappear during the first few hours following a meal, but reappear after an interval of at least six days; their presence has been noted up to the 25th day.

The results of inoculating ground up lice into monkeys show that from the sixth to the fifteenth day the spirochaetes are always virulent. Before this period the lice are rarely infective, and after infection only very exceptionally.

There is no parallel therefore between the presence of visible spirochaetes in the louse and the infectivity of this insect. On the other hand, the moment which precedes the reappearance of spirochaetes is the time when the lice are most infective, whilst the minimum of virulence is after the adult stage of the spirochaetes has been reached.

2. In monkeys the duration of the immunity following a first attack of relapsing fever is very variable. In the author's experience it has varied from rather less than two and a half months up to more than two years.

3. There is no longer the slightest doubt that for man the bites of lice infected with blood containing spirochaetes are quite innocuous. It is by crushing the lice and scratching and excoriation of the skin, or contamination of the conjunctiva by dirty fingers, that transmission is effected.

4. Both in the louse and in the blood of man, the spirochaete of relapsing fever evolves from an invisible virulent form into an adult visible stage which ceases to be virulent.

Virulence and the power of multiplication seem to be almost exclusively the property of the invisible form; arrived at the adult state the spirochaete tends to lose both these properties. This theory would explain why the question of the method of reproduction in spirochaetes has not yet been elucidated.

E. H.

Fantham (H. B.). The Granule Phase of Spirochaetes.—*Ann. Trop. Med. & Parasit.* 1914. Dec. Vol. 8. No. 3. pp. 471–484.

In this interesting article the author reviews recent work on the morphology of spirochaetes with special reference to the nature of the granules that are often formed by these parasites. The author's conclusions, supported by his own work in addition to that of others, are as follows :—

" 1. It is generally accepted, at any rate by those who have worked on the organisms, that spirochaetes form granules by multiple fission. The formation of such granules, variously known as Leishman granules, coccoid bodies or spores, has been observed by various workers in molluscan spirochaetes, in blood spirochaetes, and in *Treponema pallidum*, among others. The significance of the granules, whether cyclical or degenerative, only is in dispute.

" 2. There is danger of generalisation on incomplete evidence in the case of spirochaetal granules. It has never been asserted by any of the investigators who have continued and confirmed Leishman's work that *all* granules seen in the various tissues of infected ticks (*Ornithodorus moubata* and *Argas persicus*), especially those of the gonads and Malpighian tubules, were of spirochaetal origin. Nor was it ever asserted by Leishman and his supporters that other granules, for example, of a possible mitochondrial or secretory nature, could not occur in tick cells.

" 3. The present writer in his experiments examined control ticks as far as possible, as well as other ticks, such as *Ornithodorus savignyi* and *Ixodes ricinus*, which were not infected with spirochaetes. The granular structures figured by Marchoux and Couvy (1913) [see this *Bulletin*, Vol. 2, p. 365] were sometimes seen in the various tissues of the ticks, but often they were not so marked as represented in the figures of those authors.

" 4. The necessity for detailing the climatic conditions, especially of temperature and humidity, under which experimental ticks whether infective or non-infective were kept, cannot be too strongly urged.

" 5. Morphological variation in spirochaetes, due to nutrition affecting growth and division, is well known, and was discussed by the present writer in 1909. The value of gentian violet as a stain in the investigation of spirochaetes was recorded by the writer in 1907 and 1908. These two points, on which Marchoux and Couvy lay stress, are not new.

" 6. Marchoux and Couvy's postulate of " invisibly " thin or ultramicroscopic spirochaetes is distinctly weak, and seriously vitiates their contention that spirochaetes remain as such throughout their existence in the tick, and that they must occur as spirochaetes in inoculation material.

" 7. Small spirochaetes have been seen to form and emerge from clusters of refractile spirochaetal granules in fresh infected tick material when examined under dark-ground illumination. Such spirochaetes may invade any organ of the tick and remain therein for long periods.

" 8. There is evidence to show that spirochaetal granules obtained from the organs of infected ticks grow *in vitro* into spirochaetes.

" 9. Detailed and prolonged studies of *Spirochaeta bronchialis* have been made in Khartoum by the writer. It was found that the spirochaete formed granules (coccoid bodies or spores) and that these were the cross-infective stages of the organism. The spirochaetiform phase of *S. bronchialis* dies rapidly outside the human host.

" 10. Recent important researches by Sergent and Foley (1914) have shown that the causal agent of North African relapsing fever, besides its spirochaetiform stage, possesses a very small and equally virulent form which it assumes during apyrexial periods in man, and during a period following an infecting meal in the louse. Very probably such a minute form is of a granular or coccoid nature. Nicolle and Blanc (1914) conclude that the organisms are infective in the louse just before they reappear as spirochaetes."

E. H.

Bronfenbrenner (J.). **A Simplified Method for Cultivating Spirochaetes on Liquid Media.**—*Proc. Soc. Experim. Biol. & Med.* 1914. June 6. Vol. 11. No. 6. pp. 185–187. With 1 fig.

The author describes a modification of Noguchi's original method of cultivating spirochaetes (see this *Bulletin*, Vol. 1, p. 141), which has the advantage of doing away with the rubber stopper connection between the upper and lower parts of the apparatus, often a source of contamination.

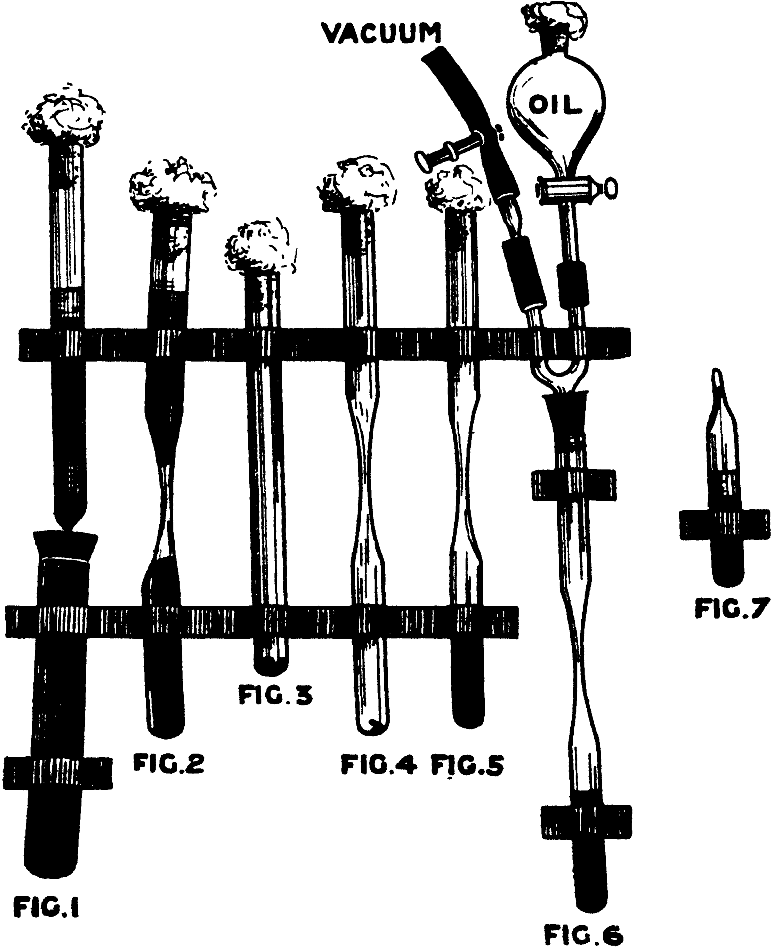

FIG.1 FIG.2 FIG.3 FIG.4 FIG.5 FIG.6 FIG.7

"This new method can be used in two different ways. Firstly, one can use the tube as shown on Fig. 2 which instead of having the rubber connection of Noguchi joining its two parts as shown in Fig. 1, is made entirely out of one glass tube; but otherwise can be used exactly as Noguchi's apparatus, namely the lower part in which the piece of rabbit kidney is put before the tube is drawn out, is filled with the ascitic broth or sheep serum water up to the point where the tube broadens out again; another

piece of tissue is placed in the upper portion of the tube and this tube is filled with the ascitic agar into which the spirochaete culture is placed.* Sterile paraffin oil in a thin layer is placed above the agar and the tube is incubated. Spirochaetes during their growth filter through into the lower portion of the tube exactly as in Noguchi's method. This method is especially convenient when one intends to open the tube many times to examine its contents. The other and better way however of cultivating spirochaetes which does away entirely with the upper part of the tube,† is the following :—I put a piece of tissue at the bottom of the tube ; draw it out as before ; introduce by means of a capillary pipette the spirochaete culture and ascitic broth in the lower tube ; connect the tube with the vacuum pump, as shown in Fig. 6, warming the lower part of the tube in a water bath at 37° to facilitate the exhaustion of the air ; cover the ascitic broth, after exhaustion, with sterile paraffin oil by means of a special arrangement taking advantage of the negative pressure in the tube, and finally seal the lower part of the tube at the point of strangulation as shown in Fig. 7. The paraffin oil in this tube makes it possible to preserve spirochaetes alive even after the tube is once opened. By this simple method I have been carrying successfully my subcultures of spirochaetes for the last three months."

M'Leod (J. W.) & Soga (A. R. B.). **A Simplified Method for the Cultivation, in Fluid Media containing Coagulable Albumin, of Bacteria requiring Anaerobic Conditions, notably the Pathogenic Spirochaetes.**—*Jl. of Path. & Bact.* 1914. Oct. Vol. 19. No. 2. pp. 210–213. With 1 fig.

The author describes a simple modification of Noguchi's method of cultivating spirochaetes, which is capable of general application to the cultivation of anaerobic bacteria in fluid media, with the exception of such bacteria as cause active gas formation.

An ordinary tube is fitted with a perforated rubber bung. A piece of glass tubing is introduced to within a short distance of the lower end of the bung, and the free part of the tubing is drawn out into a capillary tube and bent over at an acute angle. The tube is then filled to half or two-thirds of its depth with peptone bouillon. The bouillon is then boiled and when it has cooled a portion of sterile rabbit's kidney is introduced. Then a piece of cotton wool, which has been threaded through a glass bead, is soaked with the material it is desired to inoculate, and this also dropped in the tube. This method ensures that the organisms which are to be cultivated shall, from the outset, be in that area of the tube where cultural conditions are likely to be most favourable, *i.e.*, in the neighbourhood of the kidney. Finally, ascitic fluid is run in with a pipette till the level of the liquid within the tube is within a distance of its mouth which corresponds to half the depth of the bung. The bung is now introduced and, as it is pushed well down in the tube, the fluid gradually rises into the glass tubing, and when it reaches the bend of the capillary tube the open end of the latter is sealed in the flame.

Fluid can easily be withdrawn at any stage of the culture by merely sterilizing the capillary tube, then breaking off the tip and introducing a very fine capillary tube.

***It was found that spirochaetes penetrate into the lower tube more readily if 1 per cent. agar is used for the ascitic-agar mixture instead of 2 per cent., as recommended by Noguchi.**

†A Florence flask with a long neck can be used in place of the tube if a larger quantity of culture is wanted.

Employing strains of *Treponema pallidum*, *T. microdentium* and *Spirochaeta refringens*, respectively, the author obtained successful cultures in 50 to 60 per cent. of the cases. More rapid and copious growth was obtained by using ascitic fluid that had been exhausted previously by means of a vacuum pump than in a parallel culture put up with another portion of the same ascitic fluid which had not been exhausted.

E. H.

SAPHIER (Johann). **Ueber die Herstellung der haltbaren Kollargolpräparate von Spirochäten und Hyphomyzeten.** [The Production of Permanent Collargol Preparations of Spirochaetes and Hyphomycetes.]—*Wien. Klin. Woch.* 1914. Aug. 13. Vol. 27. No. 33. pp. 1214–1215.

In the *Centralblatt für Bakteriologie*, Vol. 63, p. 7, NITSCHE described a modification of BURRI's method of demonstrating spirochaetes. The method consisted in treating the smears with colloidal metals and such preparations show the parasites very clearly, but have the disadvantage that they fade in a few weeks. The author describes a modification of the method by means of which permanent preparations may be obtained.

Ordinary dry smears are treated with 1 to 2 per cent. collargol solution and after two or three minutes the slides are placed vertically and dried in the air. The preparations are then put aside for one to three days after which they are fixed by a short immersion in 2 per cent. sodium hyposulphite, then washed in running water and dried.

Such preparations are said to be permanent and to give very sharp clear outlines of the parasites.

E. H.

MALARIA.

HODGSON (E. C.). **Malaria in the New Province of Delhi.**—*Indian Jl. Med. Research.* 1914. Oct. Vol. 2. No. 2. pp. 405–455. With 5 charts. 5 plates and 7 maps.

This elaborate report, copiously furnished with maps, charts, illustrations and tables, though it is certain to prove of the greatest service locally, scarcely requires a lengthy summary here. It is concerned with the following subjects :—

1. The geography, physical features, climate and population of the Province.
2. The anopheline mosquitoes found therein.
3. The relation of these mosquitoes to the spleen and parasite rate.
4. The larvivorous fish of the Province.
5. The amount of malaria present, as illustrated by maps and charts.
6. The conditions generally as regards malaria throughout the Province, including Delhi city.

The author's conclusions and recommendations complete the paper.

It may be noted that the new province is merely a strip of territory about 25 miles long by 17 wide, that it contains one large city, namely Delhi, and numerous small villages.

Malaria chiefly occurs about the commencement of the cold weather, when the pools left by the monsoon, which have been the breeding places of countless anophelines, are beginning to dry up. Only four species of these can be considered as important factors in the spread of malaria. These are : *A. culicifacies*, *A. stephensi*, *A. rossii*, and *A. fuliginosus*. In the first two only did dissection reveal the presence of malarial parasites. It is doubtful if the other two are operative to any extent.

The four larvivorous fish found to be of value are *Trichogaster fasciatus*, *Barbus phutunio*, *Nuria danrica* and *Ophiocephalus punctatus*. [See this *Bulletin*, Vol. 2, pp. 652 and 653.] The first mentioned seems the hardiest and most effective, a good example, accustomed to captivity, devouring fully 200 anopheline larvae in a day.

The same useful, graphic method for making maps is employed as that mentioned and illustrated in the review of the author's paper on Madras [see this *Bulletin*, Vol. 5, p. 42], and in certain cases a new schéme of colour conventions for the circle sectors has been added, so that the proportion of births to deaths, the percentage of enlarged spleen in children and the relative prevalence of each variety of mosquito during the fever season can be seen at a glance in the case of each district or area.

It is shown that the country to the south of Delhi city is far healthier than that to the north, and that the city itself holds an intermediate position. Further, it was found that the relative frequency of occurrence of carrier mosquitoes corresponded remarkably closely with the amount of malaria judged by other methods.

The rest of the report is chiefly of local interest, but it is gratifying to note that the proposed cantonment site is the area which suffers least of all from malaria. The recommendations vary greatly in their nature. Many, especially those for the Bela, an old river-bed and now a marshy strip, indicate the necessity for engineering operations. The author discusses various proposals and indicates useful temporary measures.

[It is clear from this and other reports that the old haphazard days are over, and that a new spirit is abroad in India, where the sanitary motto would now, most fortunately, appear to be "Look before you leap."]

A. Balfour.

GILL (C. A.). **Report on Malaria in the Punjab during the year 1913, together with an Account of the Work of the Punjab Malaria Bureau.** Lahore. 1914. 8pp. F'cap. With Appendix, 3 charts and 1 map. Printed by the Supt. Govt. Printing, Punjab.

Papers dealing with various aspects of the above subject have so frequently been summarised in this *Bulletin* that it is unnecessary to discuss Captain Gill's latest contribution at any length. Suffice it to say that he considers both the endemic malaria of the Punjab and the epidemic malaria present in 1913. A brief report of the work done by the Punjab Malaria Bureau is given and a general note on anti-malaria measures, in the course of which the author expresses the opinion that "practical results of considerable magnitude may be attained within a comparatively short time." "Mortality" and "Fever" charts for the Punjab from 1867 to 1913, and a chart showing the rainfall and the monthly fever mortality in the Punjab during 1913 are features of this communication.

A. B.

PERRY (E. L.). **Endemic Malaria of the Jeypore Hill Tracts of the Madras Presidency.**—*Indian Jl. Med. Research.* 1914. Oct. Vol. 2. No. 2. pp. 456–491. With 5 plates, 1 chart and a map.

This is a lengthy and very thorough report which considers every aspect of the problem of endemic malaria in the Jeypore Hill tracts, a region midway between Calcutta and Madras. Though full of local interest, it cannot be said to present anything either new or of special value for the general reader. Hence it is unnecessary to do more than record the fact that in this district malaria is severe and blackwater fever of frequent occurrence. Anophelines, however, are comparatively scarce. As the author says, "Serving in the Jeypore country is like serving in a hostile country where the enemy have untold reserves of ammunition, but a limited number of rifles. In the Jeypore country the supply of ammunition in the shape of parasites of a deadly type in the blood of the aborigines is practically unlimited, but *the supply of rifles in the guise of anophelines is distinctly limited.*"

Hence this is a place where the value of personal prophylaxis is very clearly in evidence.

A. B.

MUSGRAVE (W. E.), WALKER (E. L.), JACKSON (T. W.), BANKS (C. S.), VAZQUEZ (A.), GUTIERREZ (P.), DALBURG (F. A.), CONCEPCION (I.), COX (S. L.) & GUZMAN (A.). **Sanitary Survey of the San José Estate and Adjacent Properties on Mindoro Island, Philippine Islands, with Special Reference to the Epidemiology of Malaria.**—*Philippine Jl. of Sci.* Sect. B. Trop. Med. 1914. Apr. Vol. 9. No. 2. pp. 137–197. With 1 plate and 2 text figs.

The San José estate lies on the west coast of the island of Mindoro and extends over from 210 to 260 square kilometres. It lies between sea and mountains and presents a problem for the tropical sanitarian. Although its lands are very fertile it has long been known as the "white man's grave," and even the wild native tribes shun the locality. As at the present time, so in the past, malaria would seem to be the chief cause of the high mortality rate amongst the 3,200 people employed on the estate and the remaining 2,300 scattered about the municipality of Pandorocan of which it forms a part. The barrios or villages of this municipality are in a very bad sanitary condition and, according to DALBURG, are the most generally and severely infected in the Philippine Islands.

The sanitary survey was very complete, but it is only necessary to notice certain points in connection with the malaria aspect of the question, and even these are chiefly of local interest.

As regards mosquitoes, *Myzomyia rossii* and *Culex ludlowii* are specially in evidence, though already something has been done in expelling them from certain areas. The former can breed both in fresh and salt water and is the only abundant species in the Philippines which has been proved to be a malaria carrier.

A blood survey of 1,095 persons showed that 34·06 per cent. of the inhabitants harboured malarial parasites, while a spleen survey showed splenomegaly in 26·21 per cent. In one village the spleen index in children was 98 per cent. It appeared that the percentage of total agreement between the spleen rate and the parasite rate was greater in children than in adults. So far as the determination of the incidence of malarial infection at San José went, the parasite rate was found to be the more reliable method because more cases were discovered by its means, and because the results in positive cases are unequivocal. Some 35 per cent. of the total population are infected with malaria, and this infection is kept up by recurrence in old cases, by the immigration of new cases and by fresh infections.

The questions of infant mortality and of tuberculosis are the most important sanitary problems in the Philippines, but that of malaria comes next and is very much to the fore on the west coast of Mindoro. The sanitary problem of the estate as a whole is likened to that which confronted the Americans at Panama and the lengthy list of recommendations which concludes the paper is based upon Canal Zone experience. Special stress is laid on the prevention of malaria from without, and for this purpose the following measures are essential:—

1. There should be arrangements for proper physical examination of all laborers at their points of embarkation and before their services are accepted by the company.

2. Communication with the badly infected barrios adjacent to the property must cease, and in the enforcement of this phase of the question generous Government support will be necessary. As will be indicated in

the final report of the Commission, a number of these barrios should be transferred to more healthful locations, and aggressive and persistent municipal effort should be employed in cleaning up the other infected places.

A. B.

i. CARTER (H. R.). **Impounded Water. Some General Considerations on its Effect on the Prevalence of Malaria.**—*U.S. Public Health Rep.* 1914. Dec. 25. Vol. 29. No. 52. pp. 3458–3468. With 2 figs.

ii. **Impounded Waters. Their Effect on the Prevalence of Malaria—Survey at Blewetts Falls.**—*Ibid.* 1915. Jan. 1. Vol. 30. No. 1. pp. 15–33. With a map.

i. The effect of impounding water for industrial purposes by means of a dam will vary, so far as anopheline breeding places are concerned, with the local conditions, but it will certainly have the effect of changing the location of such breeding places. As the author points out, this would probably be a disadvantage in the malarious regions of the U.S.A. for, in these localities which have long been settled, the site of residences has been determined by the healthiness of the location, the more malarious situations being avoided. The conditions affecting the breeding of mosquitoes in the pond are :–

1. Change of level under normal operation of power plant. Changes of elevation within a shorter time than the cycle of mosquito development should tend to prevent breeding.

2. Winds. The effect of winds is to lessen breeding. It is greater in the case of the pond than in that of the river or stream before impounding. Waves raised by wind are said to drown larvae.

3. Driftwood and "floatage." Large driftwood protects larvae ; small "floatage" saves them from the attacks of fish ; hence both do harm.

4. Bushes growing in the pond. Until they die these are harmful as they prevent the larvae-protecting drift from reaching the bank, and also guard the shore from wave action which is detrimental to mosquito life.

5. Grass and weeds. Grass growing in shallow water should protect larvae from fish.

6. Algae. Their presence should influence the breeding of mosquitoes—in what manner is not stated [probably favourably], but anophelines are rarely, if ever, found along with dead and decomposing algae.

7. Fish and other aquatic enemies. Their influence will depend on local conditions. In one instance large numbers of a "water flea," or "water boatman" of the genus *Corisa*, which are said to feed on mosquito larvae, were found in water where the latter were not present although one would have expected to find them.

The author gives instructions as to how a pond survey would be made, and points out that a pond undergoes much change within the first few years of its existence. As it gets older it should become less suitable for mosquito breeding, save as regards the growth of aquatic grasses and algae.

ii. This paper is really a continuation of the theoretical one just summarised, and gives an account of the conditions found in the case of the pond of the power plant at Blewetts Falls, North Carolina. Most of the author's views, as above expressed, received confirmation. It may be noted that large driftwood formed a very poor protection for larvae, and that the fall in level of the pond acted as an efficient deterrent to mosquito production because much "floatage" (small drift) was stranded, and so the larvae were rendered more accessible to the attacks of fish.

[These are interesting papers and deal with a question which has not received much attention in the past. As tropical countries develop such problems will probably present themselves more frequently, and reference to this work is likely to be useful. For example, large schemes for impounding the water of the Blue Nile and the White Nile have been mooted, and the effect of such measures on mosquito life and prevalence will have to be carefully considered, especially in the former case. They are likely to be wholly beneficial.]

A. B.

MACFIE (J. W. Scott). **Note on Fatal and exceptionally Intense Infection with Malaria** (*P. falciparum*).—*Lancet.* 1914. Dec. 12. pp. 1354-1356.

An account of a case occurring at Sekondi in the Gold Coast Colony, West Africa, a place where mosquitoes are rife. The patient was an engine-driver, thirty-eight years of age, who lived a trying life, had bad quarters, was exposed to mosquito bites, suffered frequently from malaria and was careless in his quinine prophylaxis.

He had been five years in India before coming to West Africa, and at the time of his fatal illness was in the fourth month of his first tour of African service.

He was taken ill on August 30th and died comatose on September 1st, his temperature reaching its highest point, i.e. 104 F. shortly before his death. An examination of blood films taken on August 30th revealed a few segmenting quartan parasites and a very heavy infection with the young ring form of *P. falciparum*.

A table shows the distribution of 2,000 red corpuscles according to the number of parasites invading them. Multiple infection was common, 271 cells, or 29·7 per cent. showing two parasites, 70 or 3·5 per cent. harbouring three parasites, and as many as 14, or 0·7 per cent. with four parasites apiece. The total percentage of cells infected was 47·65, and there were 1,423 parasites altogether in the 2,000 haemocytes counted.

Comparing this number with others reported by ROSS, ROGERS, DEEKS and JAMES, the author concludes that the case was one of exceptional severity. A considerable number of extra-cellular parasites was found, a condition which is undoubtedly rare. Macfie discusses their significance. Many appeared to be merozoites which had not succeeded in penetrating the corpuscles.

A differential leucocyte count was made, 1,000 cells being counted. There was a great increase of large mononuclears and transitionals (31·5 per cent.) and a diminution (10·1 per cent.) in the number of the lymphocytes. [Presumably under this term the author includes both large and small varieties.] The polymorphs, on the other hand, were more numerous (58 per cent.) than one would have expected.

Phagocytosis of the malaria parasites was a noteworthy feature of the films, and a table showing the percentage of leucocytes of the polymorph and large mononuclear types containing ingested parasites and pigment is given.

So far as the engulfing of parasites was concerned, the polymorphs were the more active cells, but even in the case of pigment the polymorphs were found to play almost as great a part as the large mononuclears, a sufficiently uncommon occurrence.*

A. B.

SEIFERT (M. J.). **Latent Atypical Malaria complicating the Puerperium.** *Jl. Amer. Med. Assoc.* 1914. Dec. 19. Vol. 63. No. 25. pp. 2215-2216.

Seifert discusses the influence of malaria on pregnancy, citing several authors and pointing out the necessity for repeated blood examinations in cases of masked malaria where the symptoms per se are merely confusing, and where the diagnosis rests on microscopic findings and therapeutic tests. [The latter, as pointed out by HENSON should not be relied upon as an aid to diagnosis. See this *Bulletin*, Vol. 3, p. 60.] An account is given of a very difficult case in which eventually a latent atypical malaria was found to be complicating the puerperium in a patient suffering from a long standing chronic nephritis. An acute exacerbation of the nephritis occurred, together with acute mammitis and, to crown all, a late gonorrheal infection. All this formed a very perplexing symptom-complex.

The patient, an American, aged twenty-five, had lived in Illinois all her life. When between fifteen and eighteen she suffered from anaemia complicated at one period by dropsy. She married at the age of twenty and bore a healthy child nearly a year later. On the sixth day after labour she suffered from chills and fever without any local symptom to account for them. Malaria was not then suspected, and under a sympathetic treatment she recovered and continued well until after her second pregnancy at the age of twenty-five. Labour was followed by lacerations, haemorrhages and fainting attacks. There was some rise of pulse and temperature, but both subsided to normal and the condition was looked upon as being dependent on the severity of the labour and the chronic nephritis which was known to exist.

Six days later acute mammitis supervened, together with fever and quickened pulse. These symptoms continued and, in the absence of any other septic complication, were attributed to the breast condition, even after the services of a consultant had been requisitioned. The temperature ran high, ranging from 104° to 105° F., while the pulse rate was 120 to 140. No periodicity was observed.

As the patient was losing ground, the situation was carefully reviewed, and it was found that malaria was the only disease which had

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*A paper by J. CROPPER, entitled "Phenomenal Abundance of Parasites in the Peripheral Circulation of a Fatal Case of Pernicious Malaria" (*Transactions of the Society of Tropical Medicine & Hygiene.* 1907-8. Vol. 1, p. 145) is worth consulting in this connection.—[ED.]

not been considered. This led to a blood examination, the discovery of a large tertian infection, specific treatment and rapid recovery. At a later period gonorrheal infection was found to exist.

Points of interest are that the patient had never lived in a strictly malarial locality and never had an attack of malaria until after labour. At no time were the symptoms typical of malaria. The author concludes with a plea for a more thorough investigation of all unusual cases seen in general practice, especially in the direction of laboratory diagnosis.

A. B.

SPAGNOLIO (G.). **Tremore Ritmico del Mascellare Inferiore in Donna affetta da Malaria Estivo-Autunnale.** [Rhythmic Tremor of the lower Jaw in a Woman affected with Aestivo-Autumnal Malaria.] —*Lavori d. Soc. Italiana di Patologia Esotica.* 1914. p. 151.

The patient was a woman, aged 59, who was taken in the month of October, 1913, with a typical attack of aestivo-autumnal fever which lasted more or less in spite of treatment throughout the following winter. In the month of December, there appeared a rhythmical tremor of the lower jaw which persisted even in the intervals between the attacks of fever. The tremor was involuntary and rhythmical, at the rate of 3 to 5 oscillations a second, and continued for a period ranging from a few seconds up to a minute. It increased in severity when any attempt was made to check it voluntarily, with the mouth open, but when the mouth was strongly closed it diminished considerably. The blood of the patient showed crescents.

By the assiduous use of euquinine the malarial infection was considerably reduced in intensity and simultaneously the tremor diminished in amount. The patient ceased attendance before the cure was complete, so that the ultimate result was not ascertainable. The writer thinks that the tremor depended on the malarial infection.

J. B. Nias.

MARGULIS (M. S.). **Zur Frage der pathologisch-anatomischen Veränderungen in Gehirn bei bösartiger Malaria.** [The Pathological Changes in the Brain in Severe Malaria.] —*Neurolog. Centralbl.* 1914. Sept. Vol. 33. No. 16–17. pp. 1019–1024. With 2 text figs.

This is an account of the microscopic changes found in the brain of a man who died from malignant malaria in an hospital in Moscow. The author records the case as he is of opinion that some of the brain lesions were peculiar. In this connection he specially mentions the marked evidence of stasis, the perivascular necrotic areas in the brain substance and their replacement by neuroglia substance round the vessels which are in a state of stasis; also the diffuse neuroglia proliferation in the cortex and sub-cortical white substance, a condition analagous to the sclerosis found in other parenchymatous organs.

The microphotographs, which are not well reproduced, show some of these changes and are supposed to show plasmodia in the brain capillaries.

[The condition seems to resemble what is found in sleeping sickness.]

A. B.

WERNER (H.). **Kombinierte Behandlung von Malaria (Chinin-Salvarsan. Methylblau).** [Combined Treatment of Malaria with Quinine, Salvarsan and Methylene Blue.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. Oct. Vol 18. No. 20. pp. 679–685.

Werner has found that, using salvarsan, he could clear the peripheral blood of malarial parasites in, on an average, seventeen hours whereas, employing quinine, the time was thirty-six hours. In some cases a single intravenous injection of 0·5 grammes of salvarsan has served to bring about what appears to be a permanent cure, i.e., there has been no relapse within two years of the treatment. In other cases, however, a second dose has had to be given and it is in an effort to secure the *Therapia sterilisans magna* of EHRLICH that Werner has been trying the combined therapy of which this paper treats.

An account is given of the results obtained *in vitro* by mixing salvarsan and quinine, salvarsan and methylene blue, quinine and methylene blue, and finally all three drugs together.

Only the mixtures of salvarsan and methylene blue, and quinine and methylene blue yielded clear solutions. In the other cases a cloudiness occurred which was partly or wholly cleared up by the addition of sodium carbonate.

Some animal experiments were conducted and then the combined therapy was tested both on cases of sub-tertian (tropical) malaria and benign tertian malaria. The results are shown in the form of tables and Werner concludes that in both forms of malaria a considerably reduced dose can be relied upon to give satisfactory results when a combination of quinine and neo-salvarsan is employed.

He says that efforts must be directed towards giving the largest possible doses to obtain the *Therapia sterilisans magna*, and thinks that the value of methylene blue in combination with the other drugs should also be tested in the case of man.

A. B.

CONIGLIO (C.). **Prime Esperienze sull' Azione dell' Optochin nella Malaria.** [Preliminary Experiences with Optochin in the Treatment of Malaria.]—*Lavori d. Soc. Italiana di Patologia Esotica.* 1914. pp. 152-153.

The author tried optochin in competition with chlorhydrate of quinine in equal doses on two sets of patients suffering from malaria, there being six patients in each set, four adults and two children. The dose of the remedy amounted to a gramme in the case of the adults, and 0·3 of a gramme in the case of the children. The general result was that the optochin showed itself rather more efficacious than the hydrochlorate of quinine; but the number of cases is obviously too small for a conclusive opinion.

J. B. N.

HATORI (J.). **The Anti-Malarial Campaign in Formosa.**—*Ann. Trop. Med. & Parasit.* 1914. Dec. 15. Vol. 8. No. 3. pp. 537-552. With a map and 3 charts.

In Formosa the measures taken by the Government have been chiefly directed to the treatment of malaria "carriers." The quinine preparations employed are 0·2 gramme muriate of quinine tablets euquinine powder for children and other suitable cases, and "Esanophele" pills for cases with splenomegaly. Police officials supervise their free distribution.

As a result of this systematic quininisation the parasite and spleen indices have decreased, and the fever-rate and malaria death-rate have been lowered. Tables are given in proof of these statements. The total number of persons treated was 14,454, and the cost worked out at about elevenpence per head. A map of Formosa shows the localities where the measure was put in force, and at the end of the paper the regulations embodied in a malaria ordinance and certain additional rules as regards anti-mosquito work and general hygienic measures are given.

A. B.

CRAIG (Charles F.). **The Prophylaxis of Malaria with Special Reference to the Military Service.** —*U.S. Army War Dept, Office of the Surgeon General. Bulletin No. 6.*—1914. Aug. 115 pp. With 3 charts and 1 plate.

A compact, useful and well-illustrated monograph full of information on all points relating to malarial prophylaxis and containing a chapter on the malarial mosquitoes. Here we find a table giving, so far as is known, a list of those anophelines which have been proved to be carriers of the parasites, classed according to their geographical distribution. As the table seems up to date, save perhaps as regards the mosquito nomenclature, it is here reproduced as likely to be useful.

LOCALITY.	SPECIES OF MALARIA MOSQUITOES.
United States	*Cellia albimanus, Cellia argyritarsis, Anopheles maculipennis, Anopheles quadrimaculatus, Anopheles crucians, Anopheles intermedium, Anopheles pseudomaculipes, Anopheles pseudopunctipennis, Anopheles tarsimaculata.*
West Indies	*Cellia albimanus, Cellia argyritarsis.*
Canal Zone, Panama	*Cellia argyritarsis, Cellia albimanus, Anopheles pseudopunctipennis, Anopheles tarsimaculata.*
Philippine Islands	*Myzomyia funesta, Myzorhynchus sinensis, Myzorhynchus barbirostris, Nyssorhynchus fuliginosus, Myzomyia ludlowii ?*
Central and South America	*Anopheles albipes, Pyretophorus lutzii, Cellia argyritarsis, Cellia albimanus, Anopheles pseudomaculipes, Anopheles intermedium, Anopheles cruzii.*
Europe	*Anopheles maculipennis, Anopheles bifurcatus, Anopheles superpictus, Myzomyia hispaniola, Myzorhynchus pseudopictus.*
Asia	*Myzomyia culicifacies, Myzomyia listonii, Myzomyia turkhudi, Myzorhynchus barbirostris, Myzorhynchus sinensis, Nyssorhynchus theobaldi, Nyssorhynchus stephensii, Nyssorhynchus fuliginosus, Nyssorhynchus maculipalpis, Pyretophorus jeyporensis.*
Africa	*Myzomyia funesta, Myzomyia nili, Myzorhynchus barbirostris, Myzorhynchus paludis, Cellia pharoensis, Pyretophorus costalis, Pyretophorus chaudoyei.*

The work is frankly a compilation and, as it contains little that has not appeared before, does not require an extensive summary, but the method followed by the author may be mentioned together with a few points worthy of notice. An introduction gives examples of successful malaria prophylaxis, and is illustrated by a striking chart showing the remarkable decrease in the incidence of the disease in the Panama Canal Zone amongst employees of the Isthmian Canal Commission from 1906 to 1912 inclusive.

Other charts show the results obtained in the American army. A chapter on the malaria plasmodia follows with some useful notes on objects apt to be mistaken for them, and is succeeded by the section devoted to the malaria mosquitoes. It contains much useful information within a small compass.

Anti-mosquito measures are then described, special attention being paid to the question of the aboltion of breeding places in or about quarters and barracks. In this connection the can of water often placed under table legs in the Tropics to prevent ants getting at food receives due notice. [It may be pointed out that oiled rags fastened round the table legs serve the purpose equally well.]

A chapter is devoted to the methods in vogue for protecting man from mosquito bites. The question of the size of the mesh in wire netting is important, and Craig, after reviewing the subject, says:— "From these various observations it appears to me that in the military service all screening should contain at least 18 meshes to the linear inch, and I believe that it is a mistake to use wire gauze containing more than this number, both because it is unnecessary so far as practical protection goes and because it reduces by just so much the amount of air admitted to a room or building."

The use of mosquito repellants on the skin cannot be of any great value to men on military service. A mixture of one part of bergamot oil to sixteen parts of kerosene has been used with success by American troops when marching in the Philippines. One part of citronella oil to six parts of liquid vaseline, or a teaspoonful of the oil to two ounces of ordinary vaseline, makes a good application for temporary use.

Chapter 5 is concerned with quinine prophylaxis. For military purposes the author advocates the administration of 6 grains of quinine sulphate to every soldier every day, preferably in an equal morning and evening dose, but failing that in a single evening dose. Smaller doses are useless, being inefficient and possibly also leading to the production of quinine-fast strains of the plasmodia, though Craig says there is no scientific proof that such exist.

There is a good deal about latent infection and gamete carriers and a final chapter devoted to prophylaxis in the field, in semi-permanent camps and in permanent camps. The final paragraph may well be quoted. "In conclusion," says Craig, "it may be stated that the malarial fevers are entirely preventable, and their presence, to any extent, in an army post is a reflection either upon the intelligence of the sanitary officer in control, or upon that of other authorities who, either by indifference to the recommendations of the sanitary officer or unwillingness to supply the necessary funds, have rendered the efforts at prophylaxis futile."

A. B.

ORENSTEIN (A. J.). Contribution to the Study of the Value of Quininization in the Eradication of Malaria.—*Jl. Amer. Med. Assoc.* 1914. Nov. 28. Vol. 63. No. 22. pp. 1931–1933.

In the light of what has previously been written on this subject (see this *Bulletin*, Vol. 3, p. 155 and Vol. 4, p. 380), the above paper is specially interesting. It deals with the results obtained by OLLWIG from using KOCH's method in German East Africa, and more especially in Daressalam. It shows that, at any rate until quite recently, the sanitary conditions there were by no means above reproach; it speaks of able and zealous officers being hampered in their anti-mosquito efforts by passive and active resistance, lack of funds and "red tape," and it asserts that the so-called systematic quininisation or treatment of "carriers" has been a failure. From an experiment which the author carried out it would seem that much better results can be obtained by following ROSS's method. The author does not condemn the prophylactic use of quinine. He merely states that the value of systematic quininisation is, in his opinion, very slight "in the case of a permanent community of considerable size in a country where anophelines capable of transmitting malaria abound, and where, in addition, changes of population due to immigration serve to introduce more or less continuous gamete carriers."

[Though some of the facts and figures stated bear out the author's contention, it would be well to accept his conclusions with some reserve, as he does not seem to have gone sufficiently fully into the subject to justify so definite a conclusion. He is probably correct but should furnish further proof.]

A. B.

CRAIG (Charles F.). New Varieties and Species of Malaria Plasmodia. —*Jl. of Parasit.* 1914. Dec. Vol. 1. No. 2. pp. 85–94.

Like most other protozoologists, Craig believes in the plurality of species of the malarial parasite. He points out that authorities disagree as to how many species should be recognised, and recalls the fact that in previous communications he asserted that two forms of the parasite of aestivo-autumnal malaria existed, one sporulating in 48 hours and one in 24 hours. For the latter he proposed in 1909 the name of *Plasmodium falciparum quotidianum*.

He now directs attention to the *P. vivax* variety *minuta* recently described by AHMED EMIN [see this *Bulletin*, Vol. 4, p. 88]. In 1900 he published in the Report of the Surgeon-General of the U.S. Army a description of a small plasmodium which he found in the blood of six patients from the Philippines. He quotes this description, with which he finds Emin's account of *minuta* tallies, and he expresses his conviction that the variety is a valid one.

EMIN was doubtful as to whether or not Schüffner's dots occurred in the infected erythrocytes. Craig finds they do, but not so often as in benign tertian infections, while the dots are both smaller and less numerous. He notes that this variety *minuta* is apt to be confounded with the quartan plasmodium and believes that those who have described Schüffner's dots in quartan infections have been in reality dealing with Emin's parasite.

There can be no doubt of the close relationship of the latter to the tertian plasmodium, while it can easily be distinguished from either form of *P. falciparum*. Craig does not think that this parasite is entitled to specific rank and recommends that it be known by the name Emin gave it, i.e., *Plasmodium vivax* variety *minuta*.

He then passes on to a consideration of the so-called *Plasmodium tenue* of STEPHENS, the validity of which has already been called in question by BALFOUR and WENYON [see this *Bulletin*, Vol. 5, p. 53]. Craig is in accord with them and advances very similar arguments to show that STEPHENS' parasite cannot, so far, be regarded as a new species.

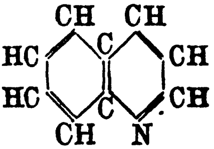
Craig has on several occasions encountered forms identical with *P. tenue*, which he is inclined to regard as a rather typical form, not of *P. falciparum* but of *P. vivax*. He advances arguments in favour of this view and also states that "the reasons underlying the production of morphologically atypical generations of malaria plasmodia are obscure, but I am convinced that insufficient dosage with quinine, and perhaps with other drugs, often leads to the production of such plasmodia and that these plasmodia may retain for several generations morphological abnormalities produced by adverse agencies, either physical or chemical."

He has seen plasmodia which had been modified morphologically by quinine return to normal morphology when the drug was discontinued, and he regards a stimulation in the amoeboid activity of plasmodia as one of the most common effects of quinine. He does not, however, argue that quinine was the cause of the peculiar shapes shown by STEPHENS' parasite, but he does think that the latter "cannot be accepted as a new species until the morphology of the parasites during the entire human life cycle at least is studied, for the only claim it now has to specific rank is the presence of slight differences in morphology during a very limited portion of the human life cycle, that is, the early unpigmented stages of development when such differences are commonly observed even in the well-recognised species of plasmodia."

A. B.

MACGILCHRIST (A. C.). **Cinchona Derivatives Inquiry. Third Communication. A Synopsis and Discussion of our Present Knowledge of the Molecular Constitution and Pharmacological Action of the more Important Cinchona Derivatives.**—*Indian Jl. Med. Research.* 1914. Oct. Vol. 2. No. 2. pp. 516–568.

This is a highly technical paper dealing with the chemistry and pharmacology of the more important cinchona derivatives in an exhaustive manner. Unless he possesses a special knowledge of organic chemistry the ordinary reader will find himself at sea. Hence it is only necessary to mention some of the conclusions at which MacGilchrist's researches have enabled him to arrive. He says that it is now generally accepted that the anti-malarial action of quinine depends upon the residual part of the quinine molecule. This appears to be a derivative of piperidine, a fission product of piperine, an alkaloid of black pepper, and it is interesting to note that some three generations ago piperidine and even black pepper were used with apparent success in the treatment of intermittent fever. König's ethyl-quinuclidine seems to be the base from which this residual part of the molecule is derived and the author suggests that an enquiry into the anti-malarial action of this substance, of piperidine and of piperidine derivatives would constitute a useful piece of research.



Quinoline.

The quinoline part of the molecule is largely responsible for the bitter taste and unpleasant by-effects of quinine, so it becomes a question if it can be eliminated. This depends on whether or not it is essential as a haptophore group. There seems to be some evidence that it may weaken or hamper the action of the residual part, and although the new compound, ethyl-hydro-cupreine [see this *Bulletin*, Vol. 5, p. 50] appears to negative such an hypothesis, its superiority may depend upon the configuration of the atoms in its molecule (stereo-isomerism). The only known stereo-isomer of quinine is quinidine, but quinine, as we know it, may be a mixture of quinine and stereo-isomers of quinine, the latter being inseparable, chemically indistinguishable and differing only slightly in optical activity. At the same time, quinine and these isomers may, for all we know, differ considerably in anti-malarial power.

It may be that when a sample of quinine is said to be ineffective the condition depends on the absence or paucity of those stereo-isomers with the greatest anti-malarial power. This applies also to cupreine and cinchonine; hence it would be well to compare quinine from different factories and quinine prepared under different conditions (i.e. as regards maximum temperature) in the same factory as regards (1) optical activity and (2) therapeutic value.

A. B.

BLACKWATER FEVER.

HATORI (J.). **Blackwater Fever in Formosa.**—*Ann. Trop. Med. & Parasit.* 1915. Jan. 29. Vol. 8. No. 4. pp. 641–657. With a map.

This paper goes to prove the close association between malaria and blackwater fever. The former is endemic in Formosa, in some parts the benign tertian infection predominating, in others the malignant. Quartan is rather rare save at a place called Yensuiko. New comers, and amongst others Japanese immigrants, are chiefly attacked. The eastern and southern portions of the island are those principally affected and it is here also that blackwater most commonly occurs, as is indicated upon a spot map. Active anti-malarial work is being carried out in certain districts by systematic quinisation of all parasite carriers and fever cases as diagnosed by the microscope.

A table shows that the ratio of blackwater fever cases to the total number of cases treated for malaria differs greatly according to the locality.

In Formosa the Japanese are the most susceptible to blackwater; then come the Chinese; thirdly the Formosans, whose ancestors came from South China; and finally the wild aboriginal tribes inhabiting the central mountains. These last are very rarely attacked, a fact which shows that want of acclimatisation, and especially of malaria immunity, is an important factor.

The condition usually attacks adults from twenty to forty years of age, doubtless because they are more frequently exposed to malarial infection. Cases occur throughout the year but are less prevalent in March, August and September.

As regards the presence of malarial parasites, Dr. NAKAGAWA observed plasmodia in 85 per cent. of cases examined prior to the onset, fourteen being cases of malignant tertian, two of benign tertian and one of quartan. Of cases examined one or two days after the onset only 12·8 per cent. were positive. In Hatori's own cases, 26 in number, parasites were found in 96·3 per cent. prior to the onset of the blackwater. In 25 of the cases *P. falciparum* was the parasite present. The remaining case was one of benign tertian infection.

Length of residence is an important factor in Formosa as elsewhere. From the time of arrival in a malarious district to the first attack of blackwater it is generally over seven months. The influence of quinine in determining an attack was apparent. As Hatori says:

> "For instance, according to my own observations on 26 cases at Karenko, where the anti-malarial quininisation of parasite carriers (and fever cases) was continued for two months after Nocht's method, in six cases blackwater appeared after the first dose or first day of taking quinine; in 8 cases after 2 days' quininisation; in 3 cases after 3 days, in 2 after 4 days; in 2 after 5 days, and in each of 3 cases after 6, 8 and 10 days respectively, in 2 cases after 11 days, and in the longest one after about 2 months (these latter cases with interruptions of 3 to 5 days)."

He mentions thymol-haemoglobinuria occurring in the course of ankylostomiasis treatment. It is quite different from malarial blackwater. The mortality in Formosa ranges from 10 to 25 per cent., and the condition is more fatal in those who have already had an attack.

Blackwater, however, is fortunately diminishing in Formosa, and is also becoming milder in nature. Amongst garrison troops there has been a great decrease or entire disappearance of the disease. This gratifying result Hatori attributes to the anti-mosquito measures adopted by the garrison troops, and to improved sanitary conditions in their environs. As the result of anti-malarial measures throughout the island it may be expected that blackwater will diminish *pari passu* with malaria.

A. B.

Deaderick (William H.). **Blackwater Fever. An Analysis of Thirty-four Cases.**—*New York Med. Jl.* 1914. Oct. 31. Vol. 100. No. 18. [Whole No. 1874]. pp. 873–875.

Although it throws little fresh light on the vexed question of the etiology of blackwater fever, this paper by Deaderick is of considerable interest.

Of the thirty-four cases which he analyses, twenty were males and fourteen females. Thirty were whites and four negroes, there being two blacks and two mulattoes. The numbers of the patients varied with the age groups, the greatest number occurring in children between six and ten years. It is worth noting that no less than twenty-seven belonged to the farming class. Alcoholism, cold and other predisposing factors played no great part in determining the onset.

In every case there was a history of malaria. Indeed in most instances there had been repeated attacks. No less than fourteen had previously suffered from blackwater fever, and some had been the victims of several attacks. One had been ill with blackwater seven times, and Deaderick mentions a case under the care of a colleague who died during his eleventh attack. In eleven instances other cases had occurred in members of the immediate family, and three families appeared to show a very marked predisposition. [The author says nothing about possible tendency to paroxysmal haemoglobinuria.]

In only one case were members of the same family affected the same year, and then the interval between the dates of onset was fifty-five days.

In thirty cases quinine was being taken for malaria when the blackwater supervened. In four, quinine could be absolutely excluded. The rest of the record deals with the clinical symptoms. To some of these references may be made. Thus, in speaking of the urine, Deaderick says that "the average variation of albumin was from one-half to two-and-a-half grams to the litre," though specimens were observed containing as much as fourteen grams to the litre.

The blood showed wide variation in its haemoglobin content. The red cells showed polychromatophilia, macro- and micro-cytosis and poikilocytosis. A number of differential leucocyte counts gave the following average proportions:—

Polymorphonuclears	52	per cent.
Eosinophiles	1	,,
Large mononuclears	35	,,
Small mononuclears	12	,,

[The author's classification suggests that large lymphocytes are included under the heading "large mononuclears," but this is not certain. He does not say how many cells were counted at any one examination.]

The blood was examined for parasites from the first to the third day of the disease. In 34 cases *P. falciparum* was found. No other variety was encountered and the plasmodia presented no unusual appearances. [No mention of leucocyte inclusions is made.]

Diagnosis presented no difficulties save in one case, which might have been a true haematuria. The author mentions a case of malaria in which the urine was so loaded with bile pigment that until it was chemically examined the case appeared to be blackwater fever. Singultus is a very bad prognostic sign. None of the cases which recovered showed it. There were ten deaths amongst the 34 cases, two from suppression and eight from exhaustion.

A. B.

STEPHENS (J. W. W.). **Studies in Blackwater Fever. II. A Schedule for recording Cases of Blackwater Fever.**— *Ann. Trop. Med. & Parasit.* 1914. Dec. 15. Vol. 8. No. 3. pp. 639–640.

Stephens prepared a blackwater schedule for his own use but found it difficult to record the data properly owing to the fact that the case reports were often vague, diffused and badly arranged, or displayed omissions. Accordingly he devised a special schedule for analysing case reports. Two examples are appended to his short paper on the subject, one showing the schedule blank, the other partly filled up as an example. On the back of the schedule space is provided for general observations and notes on the post-mortem examination if these are available. The schedule is devised in such a manner that the recorder will have as little writing as possible to do, and yet it is very complete.

[There can be no doubt this schedule will prove most useful and the idea might with advantage be extended to some other tropical diseases. It might possibly have been of interest to include queries as regards a previous history of paroxysmal haemoglobinuria, tick fever or recent tick bite, in view of the fact that everyone is not convinced that malaria plays an invariable part or the most important rôle in the production of blackwater fever.]

A. B.

BARRATT (J. O. Wakelin) & YORKE (Warrington). **The Relation of Bile Pigments to Haemoglobin.**—*Ann. Trop. Med. & Parasit.* **1914. Dec. 15. Vol. 8. No. 3. pp. 509–536. With 8 charts.**

The authors refer to their previous work, which proved that haemoglobin passed through the kidneys into the urine about ten minutes after the intravenous injection of rabbits with a solution of homologous haemoglobin in physiological saline. They found, however, that only about one-fifth of what is injected is excreted in this way, and although at the end of six hours the haemoglobinaemia practically disappears there is nothing to show how the haemoglobin has been removed from

the circulation. Their present research, which was also carried out upon rabbits, was devised for the purpose of finding out if, as the work of TARCHANOFF has suggested, the bile pigments are closely related to haemoglobin and are found as a result of blood destruction which is believed to be constantly taking place in normal animals.

They wished to ascertain if the above mentioned injections resulted in the secretion of a bile relatively rich in pigment, and also whether there was any increase in the volume of bile passed, and consequently in the total amount of pigment.

It may be said at once that they found a distinct and immediate increase both in the concentration of bile pigment and in the amount of bile pigment excreted.

As they remark :—" Two hypotheses may be advanced to explain this increase in the amount of pigment excreted, first that the haemoglobin injected is actually converted by the liver into bile pigment, or secondly that it merely stimulates the liver cells to an increased production of bile pigment. Against the former hypothesis is the fact that the increase of pigment is not so great as might be anticipated from the relatively large quantities of haemoglobin introduced into the circulation and consequent high degree of haemoglobinaemia resulting (up to 20 per cent.). The amount of haemoglobin solution found in the plasma of normal rabbits is exceedingly small, varying from ·02 to ·05 per cent. This fact seems to indicate that the degree of red cell destruction normally occurring in the living animal is slight. Assuming that the pigment of the normal bile is derived entirely from haemoglobin set free by the disintegration of erythrocytes normally occurring in the living animal, then it is rather surprising that when the degree of haemoglobinaemia is increased 400 times the amount of bile pigment should only be increased at the most sixfold.

" The work of YORKE and NAUSS showed that the mere introduction of homologous haemoglobin into the veins of normal rabbits was not sufficient to produce jaundice. No icterus of the skin or conjunctivae was observed in an animal which had received intravenously 27 gm. of haemoglobin per kilogramme of body weight. The haemoglobinaemia resulting from such injections gradually disappeared, leaving the blood plasma clear and colourless without any trace of bile pigment. Hence, although from these experiments it appears that intravenous injection of haemoglobin results in an increased excretion of bile pigment, the icterus almost invariably to be observed in blackwater fever cannot be attributed solely to haemoglobinaemia resulting from the great disintegration of red blood cells usually associated with this disease."

The technique is carefully described and certain series of observations were of a laborious nature. One lot necessitated an hourly estimation of the amount of bile excreted and the relative concentration of the pigment it contained carried out for 47 consecutive hours, and then at five-hourly intervals up to and including the 113th hour following the haemoglobin injection. In another series the observations were continued up to the 421st hour.

These and other results are displayed in the form of tables and curves, the former giving the amount of bile passed per hour, the same amount per kilo of body weight, the relative concentration of bile pigment and the relative amount of bile pigment per kilo of body weight. There are also remarks as regards the condition and appetite of the animals employed in the research, and notes on the bile, urine and post-mortem findings.

The original paper should be consulted for these and other details.

A. B.

Di Mattei (E.). **Febbre Emoglobinurica.** [Blackwater fever].—*Lavori d. Soc. Italiana di Patologia Esotica.* 1914. pp. 116–138

Gabbi (U.). **Febbre Emoglobinurica.**—*Ibid.* pp. 138–148.

Two lengthy reports, on the subject of blackwater fever, which were presented to the fourth Annual Congress of the *Società Italiana di Patologia Esotica*, at its meeting at Messina, on June 27–28th, 1914. Though excellent in style and completeness, it cannot be said that they contain anything which would not be found, in substance, in any good English text-book on tropical diseases.

J. B. N.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. 5.] 1915. [No. 5.

KALA AZAR (AND TROPICAL SORE).

Lavori della Societa Italiana di Patologia Esotica. Quarta Riunione tenuta a Messina il 27–28 Giugno 1914. (Pubblicazione per Mandato del Consiglio Direttivo ad Opera del Prof. Dott. Umberto Gabbi.)—194 pp. With 3 coloured plates and 1 text fig. 1914. Roma: Tipografia Moderna, Via Portico d'Ottavia 57.

Gatti (G.), pp. 41–53.

This paper, with the addition of a description of some further cases has appeared in *Pediatria*, Nov., 1914 [see below].

Vaglio (R.), pp. 53–57.

Cannata has already announced that he has been able to find leishmania in the peripheral blood of 15 out of 16 cases of infantile kala azar examined [this *Bulletin*, Vol. 3, p. 545]. The author has repeated the observation in eight cases with a positive result in every one. Some of these cases are mentioned by Gatti in his paper on infantile kala azar in and around Naples reviewed in this number.

Luna (F.), pp. 57–60.

The experiments here recorded have to do with the growth of leishmania on N.N.N. medium under aerobic and anaerobic conditions (oxygen removed by pyrogallate of potash) or in an atmosphere of hydrogen. The tubes were inoculated either in the water of condensation or on the surface of the agar. The results obtained show that growth proceeds well under either aerobic or anaerobic conditions. In an atmosphere of hydrogen, however, the cultures quickly die.

Rutelli (G.), pp. 60–61.

Seven cases of infantile kala azar were examined by the author and parasites were found in the peripheral blood of every one.

Maggiore (S)., pp. 62–63.

The record of a case of infantile kala azar in a child 10 months old, whose blood definitely agglutinated the *Micrococcus melitensis* in a dilution of 1 in 1,000. Culture from the blood was not attempted. The interest of the case is in the double nature of the infection.

Rutelli (G.), pp. 64–65.

The author inoculated eight mice by way of the caudal vein with spleen juice from a case of infantile kala azar. The animals were killed after the lapse of twenty days. At autopsy there was no noticeable change in the organs, but parasites in small numbers were found in the livers of all, in the bone marrow of two, and never in the spleen.

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Pavoni (G.), pp. 65–68, and *Malaria e Malat d. Paesi Caldi,* 1914. Sept.-Dec. Vol. 5. Nos. 5–6, pp. 364–367.

The author has investigated the reaction of complement deviation in both kala azar and oriental sore. In two cases of oriental sore there was complete deviation of the complement, while in kala azar the result was nearly always negative. It was positive, however, in cases which recovered, while in chronic cases it was sometimes positive, though it might disappear if the case suddenly became worse. In cases of kala azar of normal course it was invariably negative. In the case of 45 children and 25 adults tested as controls there was always a negative result. The antigen used was an aquous extract of an infected spleen, and the number of cases of kala azar investigated was thirty-four.

Abate (A.), pp. 68–74.

An account of 21 cases of infantile kala azar observed in the children's clinic of Professor Longo in Catania since June, 1913.

A series of papers follows on the complications of kala azar under the headings :—" Introduction," by Professor U. Gabbi, pp. 75–77 ; " Complications of the Mouth and Ears," by Professor U. Gabbi, pp. 77–82 ; " Complications of the Respiratory Tract," by Dr. G. Spagnolio, pp. 83–86 ; " Complications of the Digestive Apparatus," by Dr. G. di Cristina, pp. 86–92 ; " Renal Complications," by Dr. F. Giugni, pp. 92–104 ; " Complications of the Blood and Blood-forming Organs," by Professor U. Gabbi, pp. 105–107 ; " Complications of the Nervous System," by Dr. Paolo Magaudda, pp. 107–110.

It is impossible to review these papers in any detail here.

La Cava (F.), pp. 111–113 and *Malaria e Malat. d. Paesi Caldi,* 1914, Sept.-Dec. Vol. 5. Nos. 5–6, pp. 367–370.

The author discusses the treatment of oriental sore, and points out that the best type of healing is obtained by the natural process of recovery, and furthermore such healing renders the individual immune, whereas surgical interference may result in severe scarring, and leave the individual liable to further infection. Treatment of such a benign disease by the intravenous injection of dangerous drugs like salvarsan, neosalvarsan, or tartar emetic can hardly be justified. It is best to treat with ointment and dressings, to maintain ordinary cleanliness and to brush over lightly with tincture of iodine.

Giugni (F.), p. 114. With 2 coloured plates.

The author records his successful culture of *Leishmania tropica* from three cases of oriental sore in Italy. The margins of the ulcers were sterilised with tincture of iodine, and the material obtained through these margins for inoculating tubes of N.N.N. medium.

Ranieri (G.), p. 115.

The author mentions the case of a dog which belonged to a family in Campo Calabro, and showed signs of leishmania infection. Puncture of the liver performed by Dr. Giugni revealed typical leishmania. It is interesting to note that no case of the disease in a child occurred anywhere in the near vicinity of this dog's haunts, a fact which bears out the view of Gabbi and Spagnolio that it is only exceptionally that the disease in children is closely associated with the similar disease in dogs. This association has only been definitely established in five out of about five hundred cases diagnosed. C. M. Wenyon.

Laveran (A.). Les Leishmanioses chez les Animaux.—*Ann. Inst. Pasteur.* 1914. Sept.-Oct. Vol. 28. No. 9-10. pp. 823-838; Nov.-Dec. No. 11-12. pp. 885-912; Jan. Vol. 29. No. 1. pp. 1-21. With 1 text fig.; Feb. No. 2. pp. 71-104. With 2 plates and 2 figs.

This is a long paper on the subject of leishmania in animals and, being a complete account of experimental work hitherto done, is of great value to those working at this branch of leishmaniasis.

There are four sections:—(1) The natural leishmaniasis of dogs; (2) Experimental infections due to *Leishmania infantum*; (3) Experimental infections due to *Leishmania donovani;* (4) Natural and experimental infections due to *Leishmania tropica.* The paper itself is a resumé, so cannot be reviewed in any detail here. Those interested must refer to it for further particulars.

The author's general conclusions are as follows:—

Natural canine leishmaniasis, which occurs in all those regions in which Mediterranean kala azar is endemic, displays the closest resemblance as regards symptoms and pathological lesions to the experimental disease which can be produced in dogs by inoculating them with *Leishmania infantum* of human origin. The parasites seen in the natural canine disease cannot be differentiated from those of the human disease. There is therefore every probability that the two diseases, human and canine, are one. There are, however, some points of obscurity: there is great irregularity in the incidence of canine and human leishmaniasis; also it is rarely that dogs suffer from the disease in houses in which human beings are infected; further, the Indian kala azar is inoculable, though with slightly more difficulty, into dogs, yet no cases of the canine disease have been discovered in the great endemic centres in India, in spite of most careful search.

Dogs, monkeys and white mice can all be successfully inoculated with both *L. donovani* and *L. infantum*, and the same methods of inoculation are applicable to both viruses, which produce identical symptoms in these animals though the Indian virus is less virulent to dogs, while purely local cutaneous lesions resembling oriental sore have been produced in monkeys by means of the Indian virus, though as yet not with the Mediterranean virus.

A *Macacus cynomolgus* which had an immunity against the Mediterranean kala azar was found to be immune also to the Indian virus, while a control monkey was easily infected. Cutaneous lesions due to leishmania have been described in dogs. These appear to be *L. tropica.* It has yet to be determined whether the leishmania of South American dermal leishmaniasis is a distinct species or merely a variety of *L. tropica.*

Leishmania tropica is inoculable to dogs, monkeys, white mice and other small rodents. It produces usually purely local lesions, as in dogs and monkeys, which have a close resemblance to oriental sore in man. In mice, however, by intravenous or intraperitoneal inoculations, there is often a general infection without any local lesion, like that produced by injection of *L. infantum* or *L. donovani.* On the other hand, as in some cases with the virus of Indian kala azar purely local skin lesions, like oriental sore, are produced in monkeys without any general infection, one has the right to ask if *L. tropica* is merely a variety of *L. donovani* or *L. infantum* which has adapted itself to different conditions of life and transmission.

Very little has been done on the possibility of conferring immunity against kala azar by *L. tropica* injections, and vice versa. Further work must be carried out with the flagellates of lizards and of the blood-sucking flies with a view to clearing up some of the obscurity which invests the subject of the etiology of the leishmania infections.

C. M. W.

Row (R.). **Experimental Leishmaniasis in the Monkey and the Mouse induced by the Parasites in Culture.**—*Indian Jl. Med. Research.* 1914. Apr. Vol. 1. No. 4. pp. 617–621. With 2 coloured plates.

The paper describes firstly kala azar culture experiments. The success or failure of inoculation depends on three factors: (1) The susceptibility of the animal; (2) the age and particular morphological phase of the parasite in culture; and (3) the mode of injection. The monkey *Macacus sinicus* is the most suitable animal for experiment, especially the small race found in the vicinity of Madras. The author has found dogs to be completely refractory to cultures, though LAVERAN, with the same culture strain, successfully infected three out of eight dogs in Paris. Positive results either local or general are obtained only when the cultures abound in small rounded bodies resembling the original parasite, or small dots quite distinct in shape from these and looking like the fused condensed nuclei of the parasites enveloped in a mere suspicion of body protoplasm.

Intraperitoneal injection, if successful, always yields a generalised infection, while a subcutaneous injection may produce a localised nodule, or a generalised infection or both. In mice subcutaneous or intraperitoneal injections give rise to general infections. In the latter case the incubation period averages 5½ months instead of over 9 months when subcutaneous injections have been made.

Macacus sinicus, large variety, becomes locally infected with a localised nodule in 3½ to 5 months after subcutaneous injection. In the small variety a local nodule appeared after 5 months followed by a general infection in 9 months in one case, and a general infection only after 5 months in another case.

The second part of the paper is devoted to experiments with the cultures of the parasite of oriental sore. Though NICOLLE, MANCEAUX and LAVERAN have obtained a lesion in the monkey by use of cultures, the author has constantly failed with monkeys. A mouse, however, was repeatedly injected with cultures of *Leishmania tropica*. The animal was killed, apparently in good health, 9½ months after the first injection. The spleen was enlarged, while smears of this organ, the liver and the bone marrow showed a very heavy leishmania infection.

Mention is made of coccus-like bodies in the red cells of the heart blood and the author asks the question, "Could these be a 'pre-parasite' phase of the leishmania?"

C. M. W.

Pavoni (Giovanni). Contributo allo Studio della Infezione Sperimentale del *Mus musculus* con *Leishmania tropica* e *infantum*.—*Pathologica.* 1915. Mar. 1. Vol. 7. No. 152. pp. 114–116.

The author has inoculated mice either intravenously or intraperitoneally on a large scale with both *Leishmania tropica* and *L. infantum* in culture in N.N.N. medium. With *L. infantum* he has infected 32 mice and with *L. tropica* 6. In two of the *L. infantum* mice and one of the *L. tropica* mice, there developed skin lesions like those obtained by Gonder in his experiments with *L. tropica* and mice (this *Bulletin*, Vol. 2, p. 449).

One of the *L. infantum* mice 80 days after inoculation developed a swelling of the right cheek. This extended over the ear and there appeared a few days later a swelling around the anus and root of the tail. Liquid aspirated from these swellings showed leishmania. Ten days later the swellings ulcerated with a tendency to necrosis. In scrapings from these ulcers leishmania in small numbers were found. The ulceration extended somewhat during the next few days. The animal became cachectic and died on the 98th day. There was marked enlargement of the spleen and liver, which were infected with leishmania.. The second of the *L. infantum* mice which developed skin lesions showed on the 95th day swelling of both cheeks with a later extension of this round the neck and ears, while oedema round the anus appeared. These lesions followed the course of those in the first mouse and contained numerous leishmania. The animal died on the 121st day. The liver and spleen both contained leishmania and were six to eight times the normal size. In the *L. tropica* mouse with skin lesions these appeared on the 92nd day and were of the same kind as those in the *L. infantum* mice. The mouse died on the 129th day with very large liver and spleen which harboured leishmania.

The other mice infected with *L. infantum* and *L. tropica* did not develop skin lesions, but they all during the second and third month began to suffer from loss of hair and had large livers and spleens which were found to contain leishmania.

These results not only confirm those of Gonder on the production of skin lesions in mice with *L. tropica* infections, but show that similar skin lesions develop in a certain number of cases with *L. infantum* infections. Taking into consideration these results, and the fact that *L. tropica* and *L. infantum* develop indistinguishable antibodies, and that rabbits immunised against both forms of leishmania when tested with kala azar antigen (extract of spleen, or culture) possess specific though indistinguishable amboceptors, one is compelled to consider the possibility of the unity of the infective agents in Indian kala azar, infantile kala azar and oriental sore.

C. M. W.

Barbara (Mario). Per la Identificazione della *Leishmania tropica* (Bottone d'Oriente) con quella del Kala-Azar.—*Ann. Med. Nav. e Colon.* 1914. Dec. Ann. 20. Vol. 2. No. 6. pp. 554–559.

The paper is a lengthy discussion upon the relation of *Leishmania tropica* to *Leishmania donovani*, based on the results of experimental inoculations which have been performed by other observers on man and animals.

C. M. W.

KALA AZAR.

MACKIE (F. P.). **Kala-azar in Nowgong (Assam).**—*Indian Jl. Med. Research.* 1914. Apr. Vol. 1. No. 4. pp. 626–662. With 6 maps and 6 charts.

Kala-azar in Assam. Précis of a Progress Report—Feb. to Sept. 1913.—*Proc. Third All-India Sanit. Conference held at Lucknow* Jan. 19–27. 1914. Vol. 5. Papers. Suppl. to *Ind. Jl. Med. Research.* pp. 12–14.

This is a long paper on the investigation of kala azar in the Nowgong district of Assam. The disease was introduced from Goalpara in the west in 1891 and spread rapidly eastward. The rise and fall of the disease has been studied month by month and *manza* by *manza* from the year 1891 to the present time. Two maps illustrate the population changes—the first, the decrease during the period 1891–1901, this being almost entirely due to kala azar ; the other the recovery of the population during the succeeding ten years. At the present time, however, there is a general belief amongst the villagers that the disease is becoming more prevalent. The distribution of kala azar in the district is illustrated by a series of maps on which the actual cases are marked by red dots.

A special study was made of the Nowgong municipality. The population investigated numbered 4,778 persons, of which 27 suffered from " positive " kala azar, 21 were suspicious, and 64 deaths from the disease were reputed to have occurred during the last few years. One interesting point was revealed by this investigation, namely, that no case was found amongst the Jain community, which numbers about 200, and it could not be discovered that any case had occurred amongst them. A paragraph each is devoted to the question of Meteorological Conditions of Nowgong, Malarial fever and Enlargement of the Thyroid.

In the section devoted to clinical observations the age distribution of 195 persons suffering from certain kala azar is given as between 1 and 5 years 1 case, between 6 and 10 years 100 cases, between 11 and 15 years 49 cases, between 16 and 20 years 17 cases, between 20 and 30 years 12 cases, and over 31 years 8 cases. About half the cases gave a fairly clear history of kala azar, either in the household or among their relatives within five years. The appearance of kala azar in a village could generally be traced to the coming of an infected person from another village, and if the disease spread, it did so only amongst those brought into intimate personal contact with the new arrival, and the conditions almost always pointed to a personal rather than to a house infection. On the other hand, the author has been struck by the frequency with which one sees a case of advanced kala azar, who has for months, or perhaps years, lived in the utmost intimacy with his brothers and sisters, but where the latter show on examination no sign whatever of the disease.

A section of the paper is devoted to noteworthy cases. Two cases were treated with a mixed streptococcus and pneumococcus vaccine, another with salvarsan and vaccines and one with neo-salvarsan alone. There was no improvement in these cases. In an early case in a boy of 11 years parasites were found in the peripheral blood in small numbers at the fourth month of the disease. Another case of a man, age 25 years, is described as illustrating how ankylostomiasis may simulate kala azar. In one case, a woman age 17 years, death resulted from rupture of the spleen as a result of a fall. Finally a case is described in which the parasites in the peripheral blood and in the organs appeared to be undergoing dissolution at the time of death. The patient was suffering from cancrum oris at the time. In the peripheral blood shortly before death, and in the organs removed half an hour after death, the parasites appeared to be disintegrating. A puppy, however, contracted the disease after injection of spleen emulsion.

Under Laboratory Work it is stated that, excluding doubtful cases, leishmania were found in the peripheral blood of 35 out of 166 cases, or 21 per cent.

The following is a summary of animal experiments :

Monkeys.	*Leishmania.*		
	+	—	Total.
By peritoneal route ..	2	3	5
By mouth route		2	2
Still under observation ..			7
Flying Foxes.			
By peritoneal route ..	2	2	4
Other routes		2	2
Still under observation ..			4
White Mice.			
By peritoneal route ..	3	8	11
White Rats.			
By peritoneal route ..		7	7
Still under observation ..			4
Other Animals.			
Peritoneal route (cat) ..		1	1
Dogs under observation			2

During seven months 6,672 fly papers were placed in kala azar houses or in the hospital wards. The catch of insects was singularly small, and the biting ones were chiefly sand-flies (*Phlebotomus* sp.), species of Culex, and a few ticks and fleas. The insects caught were dissected, but with the exception of the sand flies none were found to contain flagellates. A herpetomonas was found in a certain percentage of sand flies. [A herpetomonas was described by WENYON in the Phlebotomus of Aleppo. *Jl. Lond. School Trop. Med.* March, 1912. Vol.I, Pt. ii. p. 98.] Some batches of anopheles were fed on patients with parasites in the peripheral blood, but no development was observed. No flagellates were found in 122 fleas taken from emaciated dogs in kala azar villages, nor was anything discovered in 100 ankylostome worms taken from the faeces of kala azar patients. A total of 469 bugs taken from the bedding of positive cases of kala azar, and 191 laboratory bred bugs which had fed on kala azar cases with parasites in the peripheral blood were dissected and 209 were injected into the peritoneal cavity of a monkey. No leishmania were found in any of the bugs and the monkey did not become infected.

Ninety-three dogs have been killed in villages and houses where kala azar is prevalent. The spleen and the bone marrow of all these dogs were carefully examined and no infections noted. Injection of marrow of some of these dogs into monkeys, flying foxes and dogs has, so far, not given any result. Reference is made to the negative examination of fish from the river Kallany and of 69 leeches which had fed on kala azar patients. The discovery of small bodies in the faeces of some kala azar cases is mentioned in another paper reviewed in this number.

C. M. W.

MACKIE (F. P.). **The Progress of Kala-Azar in a Localised Community.** —*Indian Jl. Med. Research.* 1914. Oct. Vol. 2. No. 2 pp. 505–509.

This paper has to do with kala azar in the Dudnai Thana of Goalpara District at the foot of the Garo Hills. Investigations carried out by the author have shown that in this, the oldest focus of the disease in Assam, kala azar is still smouldering. In January, 1914, 61 cases were found in twelve villages, and during the previous twelve months there had been 28 deaths and 24 new cases. A table and a map show in graphic form the progress of the disease between January, 1913, and January, 1914.

C. M. W.

YOUNG (T. C. McCombie). **Report on the Progress of the Kala-Azar Investigation during the Season 1912-13.**—*Proc. Third All-India Sanitary Conference held at Lucknow Jan. 19–27.* Vol. 5. Papers. Suppl. to *Indian Jl. Med. Research.* pp. 21–44. With a map.

This is a long paper which is chiefly of local interest and has to do with the distribution of kala azar in Assam. There is undoubtedly a consensus of opinion, particularly in the Nowgong district, that in certain areas the disease is showing increased activity of late years. During the 20 years under review the totals for the Assam Valley districts seem to have reached their lowest levels in the years 1908 and 1909; thereafter Goalpara shows an increase, the Garo Hills and Kamrup remaining about the same level. Darrang shows a decrease, Nowgong an increase, Sibsagar a few cases and Lakhimpur a few cases upon tea estates. There is thus no important change in the general district mortality from kala azar. Still, the author is inclined to think that the popular ability to diagnose kala azar is tolerably reliable and the opinion of the villagers correct, but there is a tendency to an increase of the activity of the disease in certain areas.

The paper is illustrated by several charts and tables, into which it would be unprofitable to enter here. Those interested in the details must refer to the original paper.

[See paper by same author reviewed in this *Bulletin*, Vol. 2, p. 433.]

C. M. W.

ARCHIBALD (R. G.). **A Preliminary Report on some Further Investigations on Kala Azar in the Sudan.**—*Jl. R. Army Med. Corps.* 1914. Nov. Vol. 23. No. 5. pp. 479–495.

The Sudan Kala Azar Commission was closed in 1913, and the investigations were continued at Khartoum. It was found there that the following animals could be infected :—The grey monkey (*Lasiopyga callitrichus*), the jerboa (*J. gordoni*), the gerbil (*G. pygardus*) and the dog (*C. domesticus*). In the gerbil and jerboa the disease appears to run a chronic course in no way impairing the health of the animals.

Cultures.—Tests were made of the effect of sunlight, temperature, ·2 per cent. hydrochloric acid, tap water, distilled water, river water and Bacillus coli on the cultures of the parasite of Sudan kala azar. The inference drawn is that the cultural forms are possessed of greater vitality than they are given credit for in other countries. Under unfavourable conditions, short of immediate death, the flagellates tend to revert to a cystic stage in which, possessed of thicker walls, they are apparently endowed with greater vitality and powers of resistance. Inoculation experiments with cultures performed intraperitoneally resulted in the infection of the grey monkey and the jerboa. Attempts to infect a monkey by feeding with the faeces of a kala azar patient gave negative results.

Infection by feeding. Two grey monkeys were made to ingest infected kala azar material, in one case from another infected monkey and in the other from a fatal case of kala azar. Care was taken to place the material far back in the throat of the animals so that it was prevented from coming in contact with the front part of the mouth. The animal fed on the monkey material became ill and was killed 36 days after feeding. No leishmania could be found but 2 c.c. of spleen and liver emulsion were injected intraperitoneally into another monkey which became infected. The monkey which was fed on the human material became infected and parasites were demonstrated by liver puncture 132 days after feeding. This is the first record of infection of an animal by feeding on infected material.

An attempt was made to infect a healthy pup by feeding, but though the animal showed signs of anaemia and emaciation when killed on the 162nd day, no leishmania could be found. The liver, however, showed oval and round cells containing coccal bodies similar to those described by the author and by SMALLMAN in certain cases of kala azar. Reference is made to WENYON's statement that he had found the bodies in the livers of uninoculated dogs and rats [this *Bulletin*, Vol. 3, p. 551.] The author remarks that it is strange that he has not encountered them in uninoculated animals in several hundred examinations carried out in the Sudan during the last six years. He says that CHALMERS has recently observed them in the lung of a gerbil previously inoculated with a human trypanosome and a homologous immune serum, and that they have been obtained from the liver of kala azar cases recently. The author is inclined to consider the bodies of protozoal origin, and in some ways closely associated with leishmania. [A paper by SCORDO on this subject is reviewed below.] Attempts to infect a pup by feeding on cultures of leishmania, and a monkey per vaginam, failed. Cultures placed on fresh skin abrasions on a monkey produced no infection.

Other points of interest in the paper are these :—

Human blood serum has an almost immediate destructive effect on cultures of *Leishmania donovani*. Specific agglutinins are not present in the serum of patients suffering from kala azar. Kala azar may occur as a concomitant infection with filariasis. Epidemiological and experimental evidence does not support the theory that kala azar in the Sudan is transmitted by a biting insect. A more probable source of infection appears to be some intermediate host whose habitat is in the water. No natural host has been found among the numerous animals examined in the Sudan.

C. M. W.

BASSETT-SMITH (P. W.). **Discussion on Kala-Azar or Parasitic Splenomegaly and Allied Infections.** [Eighty-Second Annual Meeting of British Medical Association, Section of Tropical Medicine.]—*Brit Med. Jl.* 1914. Dec. 19. pp. 1058–1060.

This paper contains a concise summary of our knowledge of diseases due to the parasite leishmania. Mention is made of a case ot kala azar in an adult aged 29 years, the disease having been contracted at Malta in 1911. [See this *Bulletin*, Vol. 3, p. 133.] The disease was diagnosed 14 months after he had left the island, in March, 1913. The patient was treated by intramuscular injections of atoxyl (3 to 5 grains) twice a week, and by some injections of an autogenous vaccine prepared from cultures of his own flagellates. After four and a half months' treatment leishmania could not be found by liver puncture though they were still present in the spleen. After 12 months they were present in small numbers in the spleen, but did not develop in N.N.N. medium. At the time of writing the patient's clinical picture was not much improved, the liver and spleen having remained large and the leucopenia marked. In a footnote added later it is stated that the patient had been discharged from hospital and had regained his former weight ; the blood picture was almost normal, the liver and spleen were smaller and there had been no fever for three months.

In a discussion following the reading of this paper, Professor GABBI relates how he had failed to bring about the infection of two puppies which were made to live with an infected bitch for several months and, further, to infect two young puppies by placing on them fleas from an infected dog. These experiments give no support to BASILE's flea theory of transmission. [In the report of Professor GABBI's remarks the name of the flea is stated to be *Ceratophyllus fasciatus*, the rat flea. This is incorrect, and should be *Ctenocephalus canis*, the dog flea.]

Dr. BAHR drew attention to the absence of human and canine kala azar in Ceylon, and Professor FERGUSON to a form of splenomegaly in Cairo which was not of leishmania origin. He remarked that it was curious that though kala azar was absent from Egypt, cutaneous leishmaniasis was common enough in the Nile Valley. Professor GABBI said he had seen cases of this type of splenomegaly in Sicily.

C. M. W.

SPAGNOLIO (Giuseppe) & GIUGNI (Francesco). **Stato presente del Problema della Trasmissione della Leishmaniosi Interna nei Paesi del Bacino Mediterraneo. (Rivista sintetico-critica.)**—*Malaria e Malat d. Paesi Caldi.* 1914. May–June. Vol. 5. No. 3. pp. 204–211; & July–Aug. No. 4. pp. 297–305.

A note on the first two sections of this contribution appeared in this *Bulletin*, Vol. 4, p. 395. Section 3 is a continuation of the review on the flea transmission hypothesis. The authors come to the conclusion that the absolute demonstration of the transmission of kala azar by means of human and dog fleas is lacking, and that the earlier supposed successes were due to failure to control the presence or absence of leishmania in the organs by the culture method when simple microscopic examination was negative. Liver puncture even may be no indication of an infection, as parasites may be absent in this organ and present in others.

C. M. W.

PATTON (W. S.). **The Examination of the Peripheral Blood of 84 Patients suffering from Kala-Azar at the General Hospital, Madras, during the Period from 15th June 1912 to 15th July 1913.**—*Indian Jl. Med. Research.* 1914. Oct. Vol. 2. No. 2. pp. 492–504.

This paper contains a record of the author's experience of the examination of the peripheral blood of cases of kala azar for leishmania in stained films. Of the 84 cases examined the parasite was found in the first blood film in 42 cases, in the second in 13 cases, in the third in 12 cases, in the fourth in 5 cases, in the fifth in 2 cases, in the sixth in 4 cases, in the seventh in 1 case, in the eighth in 1 case, in the ninth in 2 cases, in the seventeenth in 1 case, and in the twentieth in 1 case. Many of the patients were clearly in the early stage of the disease.

C. M. W.

SAITO. **The Clinical Observation of the Kala-Azar in a Chinese Child.** —*Sei-i-Kwai Med. Jl.* 1915. Jan. 10. Vol. 34. No. 1. (Whole No. 395), p. 2. (The Original in No. 22, Vol. 28 of the *Jl. Tokyo Med. Assoc.*).

The record of a fatal case of kala azar in a Chinese child aged 3 years and 5 months. Leishmania were always present in nine different punctures of the spleen in spite of treatment with neo-salvarsan (total quantity 0·35 gram). The locality is not mentioned in the paper, which is a review of the original article.

C. M. W.

REED (Alfred C.). **Kala-Azar. A Case Report from China.**—*Jl. Amer. Med. Assoc.* 1914. Oct. 31. Vol. 63. No. 18. pp. 1572–1573.

The paper records a case of kala azar in a Chinaman aged 28, who appears to have contracted the disease near Ichang on the Upper Yangtse River less than a year before coming to the Red Cross Hospital at Changsha, the capital of Hunan, which is 200 miles south and west of Hankow.

It is interesting to note that the disease was finally diagnosed by the discovery of leishmania within a leucocyte from the peripheral blood, and that both Ichang and Changsha are well outside the district described by COCHRAN as the endemic area for kala azar in China [this *Bulletin*, Vol. 3, pp. 130–131].

C. M. W.

LIGNOS (Antoine). **Quelques Nouveaux Cas de Guérison de Kala-Azar Infantile observée à Hydra.**—*Bull. Soc. Path. Exot.* 1915. Jan. Vol. 8. No. 1. pp. 25–28.

Four further instances of recovery from infantile kala azar are recorded from Hydra for the year 1912. This brings the total of recoveries in this island to 24 out of 100 cases diagnosed by spleen puncture during the years 1910–1912. Recovery is not necessarily limited to mild cases of short duration, for some have recovered after a very severe illness of long duration. The four cases recorded in this paper, ranging in age from 13 to 27 months, are described in some detail. The recoveries do not appear to depend on any special line of treatment.

C. M. W.

GATTI (Giacinto). **Nuovi Casi di Leishmaniosi Infantile osservati a Napoli e Dintorni.**—*Pediatria.* 1914. Nov. Vol. 22. No. 11. pp. 834–849.

This paper is a record of sixteen cases of infantile kala azar which have been seen by the author in and around Naples. Parasites were sought for in the peripheral blood of ten of these cases with a positive result in every one. In one case parasites were successfully cultivated from the peripheral blood. All the cases were diagnosed by spleen puncture.

C. M. W.

DI GIORGIO (G.). **A Proposito di 41 Casi di Leishmaniosi Infantile osservati nella Clinica Pediatrica di Palermo durante l'Anno Scholastico 1912–1913.**—*Gaz. Internaz. d. Med. Chirurg. Igiene.* 1915. Jan. 9. No. 1. pp. 4–10, & Jan. 16. No. 2. pp. 24–28.

The paper contains short notes on 41 cases of infantile kala azar observed in the clinic for children's diseases at Palermo during the years 1912–1913.

C. M. W.

IOANNIDES (George S.). Τὸ καλα-αζὰρ ἐν Ἑλλάδι. Παρατήρησις πέντε περιπτώσεων. —[Kala Azar in Greece.]—„ Ἰατρικὴ Προόδος.“ 1914. Oct. 1 & 15. Vol. 19. No. 19 & 20. pp. 362–363.

The attention of Greek practitioners has of late years been drawn to the frequency of this disease in Greek territory. The author of the present paper furnishes brief notes of five cases in children of ages varying from 1 to 5 years, and expresses the opinion that the disease is much more common in Greece than is generally thought. The blood, obtained by spleen puncture, should always be examined microscopically in doubtful cases in order to confirm the diagnosis.

J. B. Nias.

Katsas (Gregory G.). *Περίπτωσις καλα-αζὰρ μετ' ἀνευρέσεως τῶν παρασίτων ἐν τῷ περιφερικῷ αἵματι.* [Case of Kala-Azar with Discovery of Parasites in the Peripheral Blood.]—„ 'Ιατρικὴ Πρόοδος." 1914. Oct. 1 & 15. Vol. 19. No. 19 & 20. pp. 360–362.

An account of a case of kala azar in a girl of 6 years of age, who had spent all her life in the middle of Athens. The infection was probably derived from a dog with which the child had been in the habit of playing about a year before, and which had suffered from ulcers of the skin, loss of hair and diarrhoea. Unfortunately, the dog was dead at the time when the child commenced to develop symptoms so that an examination of its blood was not possible. A full account of the microscopic appearance presented by the child's blood is given; leishmania were discovered in a film of finger blood, so that there was no doubt about the diagnosis. J. B. N.

di Cristina (G.) & Caronia (G.). **Sulla Terapia della Leishmaniosi Interna.**—*Pathologica.* 1915. Feb. 15. Vol. 7. No. 151. pp. 82–83, & *Bull. Soc. Path. Exot.* 1915. Feb. Vol. 8. No. 2. pp. 63–66.

Sulla Terapia della Leishmaniosi Interna. (Nota preventiva.) —*Pediatria.* 1915. Feb. Vol. 23. No. 2. pp. 81–92.

Following the publication by Gaspar Vianna of cases of dermal leishmaniasis in South America successfully treated by intravenous injections of tartar emetic, the authors experimented with this treatment in cases of infantile kala azar. The results they obtained were so encouraging that they were led to publish this note in the hope that others would give the method a trial.

The treatment consists in the intravenous injection of a 1 per cent. watery solution of antimony tartrate on alternate days. They commence with a minimum dose of 2 centigrams and increase to a maximum of 10 centigrams. The vein employed is one at the bend of the elbow, or the external jugular or temporal. By employing a very fine needle it is possible to use the same vein repeatedly.

Ten cases have been so treated. Two, which were in the final stage of the disease, can hardly be considered and died at the commencement of the treatment. One other died of acute nephritis; it is unlikely that this was the result of the treatment as the child had a smaller dose than others which had no renal trouble. Of the seven remaining cases, five are pronounced cured and two are progressing towards recovery. The following table sets forth the features of the eight cases.

Number of case.	Age.	Duration of illness.	Duration of treatment.	Total amount of drug used.	Result.
1	m.15	months 5	days 20	centigrams 35	cured
2	y. 6	„ 8	„ 20	„ 84	„
3	m.20	„ 4	„ 13	„ 25	died of nephritis
4	y. 2	„ 5	„ 40	„ 40	cured.
5	y. 2	„ 3	„ 20	„ 25	„
6	y. 1	„ 2	„ 40	„ 35	„
7	m.20	„ 3	„ 20	„ 26	recovering.
8	m.17	„ 5	„ 10	„ 6	„

C. M. W.

YOUNG (W. McCOMBIE). **Segregation and Kala-Azar. A Useful Measure.**—*Indian Med. Gaz.* 1914. Aug. Vol. 49. No. 8. pp. 301–303.

A paper on this subject by Dr. Dodds PRICE and Sir Leonard ROGERS [see this *Bulletin,* Vol. 3, pp. 552–554] has led the author to publish an account of his similar experiences amongst the indigenous Assam population of the Golaghat subdivision of the Sibsagar district. In 1909 kala azar was found to have spread from the neighbouring district of Nowgong into some of the villages of Sibsagar. Major CHRISTOPHERS subsequently investigated this outbreak and observed that, though there was then no great tendency to spread, there was danger so long as the foci existed. Later the number of infected villages was ascertained by inspection, and there were put into force segregation measures, the success of which the author records in this paper. The infected homes were dealt with in this way. A new house was supplied and the family was removed there, a separate sleeping apartment outside being provided for the infected members. The old house was burnt down, and with it the bedding, clothing and other belongings which could presumably harbour insect parasites. Liberal compensation was paid by the Government for such loss.

The consequence of these measures has been that out of forty families removed to new sites three years ago a recurrence of the disease in a person not obviously infected upon the old site has occurred in only one case. The people appear to recognise the value of the measures and are grateful to Government for carrying them out.

The results appear to show that the measures successfully employed by Dodds PRICE and ROGERS in combating the disease among the labour force of a tea garden can be applied equally well to the indigenous population.

C. M. W.

ROGERS (Leonard). **The Bearing of Assam Tea Garden Experience on the Problem of the Etiology of Kala-Azar.**—*Proc. Third All-India Sanitary Conference held at Lucknow. Jan. 19–27. 1914.* Vol. 5. Papers. Suppl. to *Indian Jl. Med. Research.* pp. 15–20.

A paper on this question by the author was reviewed in this *Bulletin,* Vol. 3, pp. 552–554. The subject matter of the two papers is essentially the same.

C. M. W.

SCORDO (F.). **Sulla Pretesa Identità della Leishmania hominis e della Leishmania Canis.**—*Malaria e Malat. Paesi Caldi.* 1914. July–Aug. Vol. 5. No. 4. pp. 265–271.

The relation of the human to the canine kala azar was tested by the author by experimenting on the action of the serum of cases of kala azar on cultural forms of leishmania of human and canine origin. A preliminary test was conducted by observing two hanging drop preparations made by adding to two loops of culture one loop of serum of a case of kala azar. During one hour's observation the human and canine cultures behaved in much the same way. Other dilutions were tried and cultures of varying ages used but no definite differences in behaviour could be determined.

A second test consisted in adding to culture tubes of leishmania varying quantities of kala azar serum. The cultures were examined at intervals during 24 hours. These observations showed that, on the whole, the leishmania of human origin compared with that of canine origin had a lack of motility and a greater tendency to clumping of the parasites. These differences were most marked during the first hour of observation. Subsequently the contrast became much less marked.

The third test was carried out by adding two drops of kala azar serum to tubes of N.N.N. medium before their inoculation with leishmania. In four of these tubes inoculated with leishmania of human origin there was no growth on the fourth day, whereas in those inoculated with canine leishmania there was definite though somewhat limited growth.

The experiment was repeated on a larger scale by employing the serum of six cases of kala azar in children and controlling the result by using the serum of healthy dogs. A series of small serum-reaction tubes was used, and in these were placed 2, 3, 5 or 10 drops of culture of leishmania, either human or canine. To each series of tubes was added a drop of kala azar or canine serum. The tubes were incubated at 24°C. and observed from time to time. Generally speaking the series of tubes to which the human serum had been added showed a more conspicuous tendency to agglutination on the part of the human leishmania than the canine leishmania. With the canine serum the action was much less marked, though still the human cultures tended to agglutinate more than the canine.

These results show that the serum of kala azar patients has some agglutinating action on culture of leishmania, and that this action is more on the cultures of human than of canine origin.

C. M. W.

SCORDO (Francesco). **Intorno alla Natura di Certi Corpi Granulari recentemente descritti nella Leishmaniosi.**—*Malaria e Malat. d. Paesi Caldi.* 1914. July–Aug. Vol. 5. No. 4. pp. 272–276.

The author refers to the question of the nature of the cytoplasmic bodies containing various shades of red staining granules which are sometimes seen in smears of organs of kala azar patients, and which were first described by ARCHIBALD, and later by STATHAM and BUTLER, and SMALLMAN. A paper by WENYON on the nature of these bodies was reviewed in this *Bulletin*, Vol. 3, p. 550. The writer of the paper under review points out that he called attention to these bodies in an earlier illustrated paper (*Malaria e Malattie dei Paesi Caldi.* Aug. 1913), in which he showed that frequently within the large mononuclear cells the leishmania undergo degeneration, leaving embedded in the cytoplasm only granular remnants which stain red. He now discusses his observations in further detail and agrees that in smears of organs portions of the cytoplasm of large cells become broken off. If these large cells have a granular cytoplasm then, as WENYON has pointed out, these isolated masses of cytoplasm contain the same granules. In cases of leishmania infection, portions of cytoplasm containing leishmania are broken off. Similarly, when the leishmania have degenerated within the cytoplasm of the large cells, the separated cytoplasmic masses contain, instead of typical leishmania, only the granular remnants of these.

The author points out that some, at least, of the bodies seen in leishmania infections may be produced in this way, and be actually connected with the leishmania not, as ARCHIBALD has maintained, in a developmental manner, the bodies representing schizonts, but as degeneration products. In other cases he admits that the bodies have been derived from large cells filled with granules, which are not in any way parasitic.

C. M. W.

MACKIE (F. P.). **Note on some Bodies of Unknown Nature found in the Faeces of Kala-Azar Patients.**—*Indian Jl. Med. Research.* 1914. Oct. Vol. 2. No. 2. pp. 510–515. With a map and 1 coloured plate.

The author writes that on several occasions he has found in the dejecta of patients, single, paired, or sometimes a small group of bodies which, in size and general morphology, were indistinguishable from leishmania, with such modifications as one might reasonably expect these bodies to assume in faeces. In these few isolated cases the suspicious bodies were generally lying in or on a small mass of mucus in which, it may be, they were protected from the action of bacteria. Special stress is laid on the examination of faecal mucus passed during dysenteric attacks in kala azar patients with the result that these bodies were found. In order to examine the mucus, croton oil was first administered and flakes of the resulting mucus from the stool were subject to microscopic investigation. Eighty-two cases were examined with discovery of the bodies in large numbers in eight, and in small numbers in another eight. The faeces of twenty-six healthy persons examined after croton oil treatment were negative. By way of tracing some connection between these bodies and leishmania feeding experiments with monkeys and dogs were undertaken. The results have been, so far, negative.

As the author remarks, it is difficult to give an idea of these bodies by written description. They are illustrated in a coloured plate. In size they vary from 2μ to 4·5μ diameter, almost invariably possess one large uniformly staining nucleus, and often a small azurphile nodule generally placed close to the margin. There is always a definite cell wall generally seen as a clear margin, but sometimes of double contour. The cytoplasm is either hyalin, or contains certain small chromatin dots, or is marbled or purely vacuolated. The specimens were submitted to Prof. MINCHIN whose remarks upon them are reproduced in the paper.

The author does not wish to appear dogmatic over the question of these bodies, for he writes that he is quite prepared to find that they are of other origin.

[In a paper entitled, "*Beitrag zu Kenntnis der Blastomykosen*" in *Central. f. Bakt.* Bd. 67. 1912, p. 233, [see this *Bulletin*, Vol. 1,

p. 642], da ROCHA-LIMA goes into the question of the resemblance of certain Blastomycetes to leishmania in dried Romanowsky stained films. He shows that these yeast-like cells often contain two bodies like nuclei, one large and the other small. The large red staining body is not a nucleus. A comparison of the figures of da ROCHA-LIMA with those of Mackie would suggest that the latter is possibly dealing with similar yeast-like organisms.]

C. M. W.

GIUGNI (Francesco). **Sulla Presenza della *Leishmania donovani* e lo Sviluppo Colturale dal Sangue Periferico nel Kala-Azar.**—*Pathologica.* 1915. Feb. 15. Vol. 7. No. 151. pp. 84–87, and *Malaria e Malat d. Paesi Caldi.* 1915. Jan.–Feb. Vol. 6. No. 1. pp. 16–20.

This paper has to do with the culture of leishmania from the peripheral blood of cases of kala azar. A paper by the author on this subject was reviewed in this *Bulletin,* Vol. 4, p. 396. He there suggested that the difficulty of culture from the peripheral blood was due to the human blood, which was necessarily present, preventing growth. This view was criticised by CANNATA and CARONIA (*loc. cit.* p. 397) who likewise cultivated leishmania from the peripheral blood of a case of infantile kala azar. The present paper is a defence by the author of his original position. In the case of two children and a dog which showed leishmania in ordinary blood films repeated attempts at culture failed. This must mean either that successful culture depends on the necessity of there being present in the blood stream not only parasites, but parasites in some particular stage of development; or that culture in some cases is prevented by a condition of the human blood which does not exist in other cases. [In a paper by GATTI reviewed in this number, mention is made of the successful culture of leishmania from the peripheral blood of a case of kala azar.]

C. M. W.

KORKE (Vishnu T.). **A Note on the Production of Localised Lesions by *Leishmania donovani* in *Macacus sinicus.***—*Indian Jl. Med. Research.* 1914. Apr. Vol. 1. No. 4. pp. 622–625.

Experiments were conducted by Row's method of inoculation on monkeys with *Leishmania donovani.* It was found :—

1. In *Macacus sinicus, Leishmania donovani* is capable of producing purely localised lesions which take the form of nodules.

2. Injecting infective material into pockets of skin on the foreheads of monkeys is an effectual and easy way of producing such lesions. Such a procedure may at any time give rise to a systematic or generalised infection.

3. The incubation period of these nodules varies between 52 and 71 days.

4. The leishmania contained in such nodules are capable of giving rise to similar lesions in other monkeys.

C. M. W.

TROPICAL SORE.

MONGE M. (Carlos). La Leishmaniasis del Dermis en el Peru. Espundia, Uta, Juccuya, Qcepo, Tiacc, Araña.—*Cronica Med.* [*Lima.*] 1914. July 15. Vol. 31. No. 613. pp. 231–235; Aug. No. 614. pp. 251–254; Sept. No. 615. pp. 288–294 and Dec. No. 618. pp. 385–396. With 1 fig.

The author has collected the literature dealing chiefly with the dermal leishmaniasis of South America. The article, as the title indicates, refers more especially to the disease as it exists in Peru, where it is known by the name of Uta, Espundia, Tiacc-araña, Juccuya, Qcepo. The subject is treated at length from every point of view. The following are the conclusions reached by the author:—

1. The disease occurring in various parts of Peru and known under the above names is dermal leishmaniasis.

2. The disease occurs wherever tropical conditions of climate prevail, and tends to limit itself to mountainous regions. Certain clinical types are more common in particular localities; for instance, the mucosal form occurs mostly in forest country.

3. The disease is probably carried by some living creature. In the valley of the Convencion people blame a Simulium.

4. The parasite of the disease is *Leishmania tropica* (Wright). Though flagellate herpetomonas forms occur occasionally, this does not justify the view which supposes a distinct variety under the name of *Leishmania tropica* var. *flagellata* (Escomel, Monge). The occurrence of these forms may be merely an indication of increased virulence.

5. Two types of the disease occur, the dermal and the mucosal.

6. The dermal type may occur in three forms: (*a*) dry nodular form, (*b*) ulcerating form, (*c*) mixed form.

7. The mucosal lesions are always secondary to a primary dermal lesion, the leishmania chancre (*Chancro leishmaniasico*).

8. The clinical history, histopathology, aetiology, and discovery of leishmania demonstrate that these diseases are all dermal leishmaniasis.

9. The view of ESCOMEL that Uta was a form of lupus is disproved by the discovery of leishmania in the lesions.

10. The disease described by DENEGRI as peculiar to the forest regions of Peru is only the mucosal type of the same disease.

11. The cutaneous lesions respond very readily to treatment with neosalvarsan.

12. The mucosal lesions are at present incurable.

13. Vaccination ought to be employed as a prophylactic against the disease.

14. The best name to employ for this disease in South America is American leishmaniasis.

C. M. W.

CHRISTOPHERSON (J. B.). On a Case of Naso-Oral Leishmaniasis (Corresponding to the Description of Espundia); and on a Case of Oriental Sore, both originating in the Anglo-Egyptian Sudan.—*Ann. Trop. Med. & Parasit.* 1914. Dec. 15. Vol. 8. No. 3. pp. 485–496. With 2 plates.

Two cases of dermal leishmaniasis are described, one of the ordinary oriental sore type; the other, on account of involvement of the nasal and buccal cavities, resembling the South American disease, Espundia. Both patients are said to have contracted the disease in the Sudan, this being the first undoubted record that the disease exists there, for other cases hitherto described appeared to have arisen in Egypt.

The naso-oral case was of a native male, age 40 years, from Wad el Abbas near Sennar town on the Blue Nile, where he had lived for years. The disease commenced two years ago on the upper lip and thence extended into the nose and mouth. The bridge of the nose had fallen in and there was ulceration on the floor of the nose as far back as could be seen—the cartilaginous septum was almost entirely destroyed. There were ulcers on the under aspect of the upper lip; the gums of the upper jaw were swollen and spongy but not ulcerated. The gums surrounding the incisor teeth were ulcerated. Leishmania were found in all the ulcers of the mouth and nose but only in small numbers. There were no enlarged glands and no enlargement of liver and spleen.

The second case is one of the ordinary oriental sore type, there being two sores, one on the metacarpo-phalangeal joint of the right little finger and the other on the skin over the lower end of the right ulnar bone. The patient arrived in Khartoum North in December, 1912, from Egypt, and the sore appeared in July, 1913.

The author mentions another case of the oriental sore type which CHALMERS met with from the same district as the first case, which is of interest as being the chief focus of kala azar in the Sudan.

[There seems to be no doubt that the naso-oral case originated in the Sudan, but in view of the long incubation period sometimes noted in this disease the second case might have been infected in Egypt, which was left only six months before.]

C. M. W.

GIUSEPPE (Mariani). **Contributo alla Conoscenza Anatomo-Patologica della Leishmaniosi Cutanea Mediterranea.—(Bottone d'Oriente),**—*Malaria e Malat. d. Paesi Caldi.* 1914. Sept.-Dec. Vol. 5. No. 5–6. pp. 321–340.

The author describes in great detail the histological changes which take place in the skin during the development and evolution of the cutaneous leishmania affections. He comes to the conclusion that the cutaneous leishmaniases of various parts of the world are histologically identical.

The paper is a long one and must be referred to in the original by those interested in the histo-pathology of oriental sore.

C. M. W.

MANTOVANI (Mario). **La Leishmaniosi Cutanea a Ravenna.**—*Pathologica.* 1915. Feb. 1. Vol. 7. No. 150. pp. 57–60. With 2 figs.

The record of a case of extensive ulceration of the sole of the right foot which, on microscopic examination, was found to be due to a leishmania infection. The case was of four years' duration and came from Ravenna, this being the first instance of dermal leishmaniasis from this locality in Italy. The condition resisted all treatment.

C. M. W.

VON PETERSEN. **Ueber die Verbreitung der Orientbeule in Turkestan.** [The Diffusion of Oriental Sore in Turkestan.]—*Arch. f. Dermat. u. Syph.* 1914. Vol. 119. Pt. 1. p. 158.

The author has obtained details of 1,200 cases of oriental sore in the Tashkent district of Turkestan. Contrary to the generally accepted view, he finds that the disease first makes its appearance in winter (December and January). The infection is brought about rather by the insects living in the houses than by outside flies. Dogs which suffer from the disease play some part in its spread. The full details of the enquiry will appear in a later paper in the *Archiv für Dermatologie.*

C. M. W.

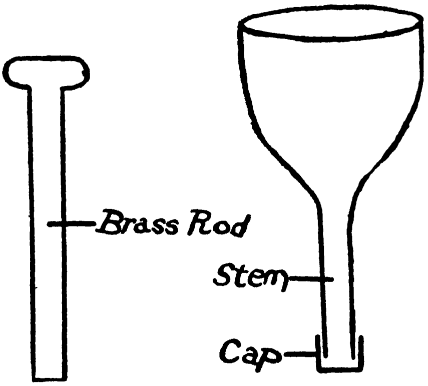
TOMKINSON (J. Goodwin). **Four Cases of Lahore Sore.**—*Brit. Med. Jl.* 1914. Oct. 10. pp. 625–626. With 2 figs.

The author records four cases of oriental sore (Lahore sore) in one family which had resided at Sialkot in the Punjab—the father, two sons and one daughter. The father had a sore on the forehead. All three children had a single sore in the middle of the left cheek and the two sons a sore on the left temple. The three children stated that they habitually slept on the right side, so that it would suggest that inoculation had been brought about by some nocturnal insect feeding on the upturned cheek.

C. M. W.

MITCHELL (T. J.). **Carbon Dioxide Snow with Special Reference to the Treatment of Oriental Sores.**—*Jl. R. Army Med. Corps.* 1914. Oct. Vol. 23. No. 4. pp. 440–446. With 1 diagram and 5 figs.

The author gives an account of his method of treating naevi, warts, sloughing ulcers, ringworm and oriental sore in India, by means of CO_2 snow in the form of a pencil, which is prepared as follows. A cylinder of CO_2 is obtained from a soda water factory. A tube of blotting paper is made by rolling it round a ruler, the end of the tube is closed by covering it with a towel, while the other end is fitted over the valve of the cylinder and bound on with a bandage. The CO_2 is turned on gently and allowed to pass till the towel feels hard and solid when the CO_2 snow within is removed and placed in a brass mould like a bottle filling funnel with the opening of the tube closed by a cap.



The snow is pushed down into the tube by a brass rod and finally the cap is removed and the pencil of snow pushed out of the tube.

The snow has a temperature of -79° C., and when pressed hard on the skin it freezes the underlying structures. As thawing takes place, redness and turgescence of the part is noticed and a blister forms in 24–48 hours. Healing goes on under a crust, and the resulting cicatrix is smooth, white and pliable. The application usually lasts from 5 to 30 seconds according to the depth and situation of the lesion. The application is repeated after an interval of 10 to 14 days. The operator's fingers can be protected by a doubled piece of lint rolled round the end of the pencil. In all 300 cases of oriental sore have been treated in this way. The simple ulcerating cases reacted best, but the sores which were raised above the surface, or were covered with foul granulations, it was found best to scrape well first with a Volkman's spoon under anaesthetic and then immediately to apply the CO_2 pencil. The results have been excellent.

The majority of the cases of oriental sore were diagnosed clinically and not by the finding of leishmania, but all cases had developed while stationed at Fort Lahore, or shortly after returning to cantonments, so there is little doubt of the diagnosis.

C. M. W.

LAVERAN (A.). i. **Infections Expérimentales de Souris, d'un Meriones, d'un Rat et d'un Macaque par la** *Leishmania tropica*.—*Bull. Soc. Path. Exot.* 1914. Nov. Vol. 7. No. 8–9. pp. 663–670. With 2 text figs.

ii. **Présentation d'un Chien inoculé avec Succès au Moyen de la** *Leishmania tropica* **sur Souris**.—*Bull. Soc. Path. Exot.* 1914. Dec. Vol. 7. No. 10. pp. 697–698.

i. In this paper the author reviews his experiments with *Leishmania tropica* and mice [see this *Bulletin*, Vol. 4, p. 401]. Of twelve mice inoculated intraperitoneally with cultures of *L. tropica*, eight were males and six of these became infected. An account of four of these is given. There was in each case, after about four months, great enlargement of the testicle which contained large numbers of parasites. The liver, spleen and bone marrow contained none. Only one of the four females became infected and this one developed a tumour at the posterior part of the abdominal wall, containing leishmania in enormous numbers. The tumour eventually retracted, leaving a scar which, on the death of the animal six months after its first inoculation, was found still to contain numerous leishmania. Parasites were also present in the spleen, liver and marrow, so that it would appear that the general infection with *Leishmania tropica* had caused the mouse's death.

A young rat was inoculated in the right testicle with material from the testicle of an infected mouse. Fifteen days later the rat was dead and, though not enlarged, the right testicle contained leishmania in very large numbers. The left testicle and other organs of the body were not infected. Three rats were inoculated in the testicle with cultures of *L. tropica*, but only one of these acquired a local infection, as was the case with the rat just mentioned. With material from the testicle of an infected mouse, a monkey (*Macacus cynomolgus*) was inoculated intra- and sub-cutaneously on the forehead and thigh in six places. Nodules appeared after the short period of nine days on the thigh, and later on the forehead; there was increase in size to that of an almond. Parasites were present in large numbers. At the time of writing the lesions were still in course of evolution.

ii. In the second paper the author mentions the inoculation of a dog intracutaneously with leishmania from one of the infected mice, as described above. The dog developed a sore at the base of one of the ears. It closely resembled the oriental sore of man.

C. M. W.

SERGENT (Edm.). **Infections Expérimentales de la Souris par des Cultures. de la *Leishmania tropica*.**—*Bull. Soc. Path. Exot.* 1915. Jan. Vol. 8. No. 1. pp. 22–25.

Attempts were made to infect six mice by intraperitoneal or intravenous injections of cultures of *Leishmania tropica* isolated from a case of oriental sore in Biskra in October, 1913. After an interval of four months the mice appeared in good health. They were killed and five were found infected, three having parasites in the liver and spleen and two in the spleen only. There were no other lesions, nor were parasites found in any other situation.

The author notes that these results differ from those of LAVERAN and GONDER, who have produced testicular and cutaneous lesions in mice by intraperitoneal injection of cultures of *L. tropica*. The differences may be due to variations in virulence and age of the cultures, or other as yet indeterminate factors. It is possible that injections of *L. tropica* produce first a generalised infection which subsides, the parasites then infecting either the skin (GONDER) or the testicle (LAVERAN).

C. M. W.

NICOLLE (Charles) & CHATTON (Edouard).—**Longue Conservation de la Virulence pour l'Homme de la *Leishmania tropica*, en Cultures.**—*Bull. Soc. Path. Exot.* 1914. Dec. Vol. 7. No. 10. pp. 700–702.

The paper records the successful production of an oriental sore on the forearm of a human being by the injection of a culture of *Leishmania tropica* which had been maintained during the four and a half years since its isolation in 115 sub-cultures on N.N.N. medium. There was an incubation period of one and a half months and the sore which developed was a typical oriental sore which is running the usual course. The observation demonstrates that the virulence of *Leishmania tropica* is not lost by long culture in N.N.N. medium.

C. M. W.

ESCOMEL (Edmundo). **Leishmania Flagelada en el Peru.**—*Cronica Med. [Lima].* 1914. July. 15. Vol. 31. No. 613. pp. 224–227.

This paper has to do with the priority of an observation made by the author some years ago on the presence of flagellate forms of leishmania in scrapings from a case of South American dermal leishmaniasis. His first communication was made on September 6th, 1911, to the Medical Society of Arequipa, and a microscopic preparation showing the flagellate forms was exhibited. In April, 1912, he corresponded with LAVERAN upon this subject. In December, 1912, LA CAVA published a paper (this *Bulletin*, Vol. 1, p. 370) giving an account of similar observations made by him in Italy. On the 12th January, 1913, the author recorded before the same Society a second case on which he had made this observation, this time in a case of espundia on the living subject, and not post mortem as in his earlier observation. This finally disproves the view which suggested that the leishmania had become flagellate after death.

C. M. W.

NELIGAN (A. R.). **A Case of *Leishmania tropica* with a Fatal Termination.**—*Jl. Trop. Med. & Hyg.* 1914. Nov. 2. Vol. 17. No. 21. pp. 322–323.

The case recorded is one of a child in Tehran, Persia, which contracted tetanus from which it died, the only possible point of entry of the organism into the body being an oriental sore.

C. M. W.

PROTOZOOLOGY.

PORTER (Annie). **The Morphology and Biology of *Herpetomonas patellae*, n. sp., parasitic in the Limpet, *Patella vulgata*, together with Remarks on the Pathogenic Significance of Certain Flagellates found in Invertebrates.**—*Parasitology.* 1914. Oct. Vol. 7. No. 3. pp. 322–329. With 17 text figs.

This paper deals with a new species of herpetomonas, *H. patellae*, parasitic in the edible limpet and with the significance of certain flagellates occurring naturally in invertebrates. It is the first time that herpetomonads have been recorded from the Mollusca, and also the first notification of their occurrence in digestive glands, the digestive gland or "liver" of the limpet being infected as well as the gut.

H. patellae is very small, the body of the flagellate form being only 5μ to 7μ long. The non-flagellate forms are relatively large, being 2μ to 3μ long and from 1μ to 1·5μ broad. Multiplication by longitudinal binary fission occurs in the preflagellate and flagellate stages. The mode of transmission is contaminative, post-flagellates being voided with the faeces of the host. The nutrition of the herpetomonad is by absorption of fluid food from its surroundings.

A summary of the experimental results of LAVERAN and FRANCHINI'S work with *Herpetomonas ctenocephali* Fantham, *H. pattoni* Swingle, and *Crithidia fasciculata* Léger, in relation to dogs, rats and mice, is given. By inoculation or feeding of these parasites to the vertebrates, infections with elements chiefly of a leishmaniform nature were produced. Attention is drawn, in this connection, to four points:—(*a*) Species of Leishmania in culture grow into herpetomonad flagellates. (*b*) A herpetomonad parasite, *Haemocystozoon brasiliense* Franchini, has been described from the human subject. (*c*) It can be inferred from the experiments cited that Leishmania and the trypanosomes probably arose from the flagellates of invertebrates. (*d*) Leishmaniform elements or latent bodies, occurring in the internal organs, have been described as part of the life-cycle of trypanosomes in vertebrate hosts. The author considers that "it is possible that the canine kala-azar occurring in the Mediterranean region is really a canine herpetomoniasis due to *Herpetomonas ctenocephali.*"

As *H. patellae* occurs in an edible invertebrate, possibly such flagellates are not without pathogenic properties, if they should find their way alive in sufficient numbers into a vertebrate.

H. B. F.

FANTHAM (H. B.) & PORTER (Annie). **Some Insect Flagellates introduced into Vertebrates.**—*Proc. Cambridge Philosoph. Soc.* 1915. Jan. 6. Vol. 18. Pt. 2. pp. 39–50. With 1 plate.

The authors recall that "LAVERAN and FRANCHINI have shown that an experimental leishmaniasis (herpetomoniasis) can be induced in mice and rats by inoculating or feeding them with *Herpetomonas pattoni* Swingle, parasitic in the gut of rat fleas, and in dogs by inoculating them with *H. ctenocephali* Fantham, parasitic in dog fleas, among others." (See this *Bulletin*, Vol. 2, p. 463; Vol. 3, pp. 122

and 515; Vol. 4, p. 381). They therefore undertook a series of experiments, but instead of using nearly associated insects and vertebrates they made "a wide divergence in order to ascertain whether an insect flagellate introduced into a quite unassociated vertebrate might become pathogenic." *Herpetomonas jaculum* Leger, parasitic in the water scorpion *Nepa cinerea*, was chosen as the flagellate, while very young mice served as vertebrate hosts. They also succeeded in infecting a puppy by feeding it on parasitised dog fleas.

The life cycle of *H. jaculum* in *Nepa cinerea* is described*. The flagellate lives in the alimentary tract; it possesses a non-flagellate stage in its life cycle, an ovoid Leishmania-like resistant body that is passed from the host with the faeces, and is capable of infecting other Nepa. The anterior part of the gut, consisting of the oesophagus and stomach, contains mostly pre-flagellate and young flagellate forms; the posterior gut, consisting of the intestine, contains flagellates in various stages of division and the resistant, post-flagellate forms—a fact not without significance in the experiments.

There were seven experiments, each with a control; some were performed in Liverpool with mice and Nepa obtained locally, others in Cambridge, the Nepa being collected in the neighbourhood.

> "In most cases an interval of a few hours was sufficient to allow of the appearance of rounded, non-flagellate forms of *H. jaculum* in the peripheral blood. The mice became weaker and either died or were killed *in extremis*. Examination of their organs showed the presence of non-flagellate (leishmaniform) and of flagellate forms in the liver, spleen, bone-marrow and blood, occasionally in other organs. The liver was always the seat of heaviest infection. The parasites kept the facies of *H. jaculum* and were pathogenic to the mice. The number of flagellate forms present and their fine development was noteworthy, and is unlike what has been obtained before in the experiments by LAVERAN and FRANCHINI with other insect flagellates in mice."

Protocols follow. Four of the mice were fed, three were inoculated intraperitoneally; six young mice died, or were killed when they were very ill, and one, an adult weighing 17 gms., recovered. Two months later it was well and had gained weight. Parasites were seen in its blood on the fourth day after inoculation, but not later.

In the puppy experiment the animal was fed during a period of 36 days with a total of 190 dog fleas, *Ctenocephalus canis*, at nine feedings. Some of the fleas were infected with *H. ctenocephali*. Ten days after the last feed the puppy became ill with fever but rapidly recovered. "Examinations of the blood made 21 days after the first and 12 hours after the sixth feed of fleas showed a very few leishmaniform elements both free in the blood strean and, in one case, within a mononuclear cell." The puppy was still under observation. The authors point out in connection with these experiments that *Leishmania* develops into a flagellate herpetomonad stage in the culture tube and in the gut of certain insects.

An account follows of the morphology of *Herpetomonas jaculum* in the mouse, illustrated by a plate of 20 figures. Shortly after their introduction, the flagellate forms become rounded, the flagella disappear and the parasites are found in the blood, usually as free leishmaniform bodies. Similar forms occur in the internal organs where later a development occurs to typical herpetomonads. Multiplication takes place in the mouse much as it does in the Nepa. Rounded leishmaniform parasites have been found within leucocytes, but never numerously. The dimensions of flagellate and non-flagellate forms agree with those of *Herpetomonas jaculum* in the insect.

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* See PORTER, *Parasitology*, Vol. 2, p. 367.

A discussion follows on the forms of *Herpetomonas jaculum* most infective to mice. It is concluded from the experiments that "the post-flagellate stages have greater powers [than pre-flagellates or immature flagellates] of growing and multiplying successfully in the vertebrate host." Thus there seems evidence to show that "the form of insect flagellate best adapted for transference from insect to insect is also the form most effective in producing disease." The authors compare the induced herpetomoniasis of the mouse with leishmaniasis. It is noted that "the non-flagellate forms of *H. jaculum* in mice have their blepharoplasts in almost any position other than that characteristic of the Leishman-Donovan body." In this herpetomoniasis of mice well-formed flagellates are found in the liver and elsewhere, which is not the case in kala azar. "That the two diseases are allied is undoubted." The conclusions are as follows:—

"1. Insect flagellates, e.g., *Herpetomonas jaculum* (Léger) from *Nepa cinerea*, and *Herpetomonas ctenocephali* (Fantham), parasitic in the dog-flea, *Ctenocephalus canis*, can live inside certain vertebrates (e.g. mouse and dog respectively) and can multiply therein. This we have shown experimentally.

"2. If such flagellates be inoculated intraperitoneally or are fed by the mouth in food, the flagellates can find their way into the blood stream and internal organs (e.g. liver, spleen, bone-marrow) of the vertebrate host.

"3. The insect flagellates are pathogenic to the vertebrates experimented upon, producing symptoms like those of leishmaniasis (Kala-azar).

"4. The oval post-flagellate forms appear to be more capable of developing in vertebrate hosts than are other stages of the herpetomonad parasite of the insect.

"5. It may be expected that the various leishmaniases occurring in different parts of the world will prove to be insect-borne herpetomoniases."

A. G. B.

MACKIE (F. Percival). **A Flagellate Infection of Sand-Flies.**—*Indian Jl. Med. Research.* 1914. July. Vol. 2. No. 1. pp. 377–379. With 1 plate.

A number of *Phlebotomus minutus* was examined and found to contain Herpetomonas flagellates [in the gut ?]. Seven out of 65 female flies were infected. The parasites "were only found when the remains of a blood meal were present in the fly; neither the unfed females nor the males were ever found to be infected." Flagellate and round forms of the parasite were observed and are represented by 11 figures on a plate.

The author's conclusions are as follows:—

"Ten per cent. of female sand-flies, *Phlebotomus minutus*, were found to be infected with a flagellate of the genus *Herpetomonas*.

"It is probably a natural parasite of the fly, and is not likely to have any relation to the occasional habit of *Phlebotomus* as a human blood sucker.

"The natural host of *Phlebotomus minutus*, as HOWLETT has shown, is probably the common wall lizard.

"As I cannot find that the flagellate has been previously described, I suggest for it the name *Herpetomonas phlebotomi* (nov. spec.)."

In an addendum the author states that the result of the injection of the herpetomonad into the body cavity of a wall lizard was negative.

[It should be noted that WENYON in 1912 recorded the presence of a Herpetomonas in the gut of Phlebotomus in Aleppo.]

H. B. F.

WOODCOCK (H. M.) & LAPAGE (G.). **Observations on the Life-Cycle of a New Flagellate, *Helkesimastix faecicola*, n. g., n. sp.: Together with Remarks on the Question of Syngamy in the Trypanosomes.**—*Proc. Roy. Soc.* 1915. Feb. 1. Vol. B. 88. No. B. 604. pp. 353–370. With 2 plates.

The organism, *Helkesimastix faecicola*, n.g., n.sp., was found in goat dung and sometimes in sheep dung. It is considered to be a "passenger," passing through the gut of the host passively in an encysted condition. The authors studied it in culture, using principally Lemco-agar. The permanent cysts are spherical or slightly ovoid, 3 to 3·5μ in diameter. Excystation takes about twenty-two hours in fresh media, and only occurs when there is a plentiful development of active, aërobic bacilli. The body of the flagellate is elongate and fairly cylindrical, the anterior end being bluntly rounded and the posterior end tapering. The body is usually about 6 to 7μ long and 2 to 2·5μ broad. There is a single long flagellum arising at the anterior end and directed backwards. In life the flagellum is usually contiguous to the body for almost the entire length of the latter, and lies along the middle of the upper (dorsal) side of the organism, but no attaching membrane is developed. It is a trailing flagellum. The nucleus is spherical and near the anterior end, and contains a karyosome. There is a small contractile vacuole, generally situated towards the posterior part of the body. The principal mode of nutrition is by osmosis. The more usual type of division is by transverse fission, but occasionally it may be more in a longitudinal plane. Conjugation occurs in the life-cycle, and the resulting zygote becomes surrounded by a "shrinkage" cyst. After a certain number of subcultures have been made the flagellates no longer undergo syngamy, followed by cyst formation. The "intensive" culture of the flagellate has resulted in the loss of power to undergo true syngamy and to form cysts. The further existence of the strain is then dependent on continued transference to fresh "constant" medium.

The authors consider the bearing of this phenomenon on the life-cycle of trypanosomes in vertebrates, in which conjugation or syngamy is absent. They consider that "the loss of syngamy is due to the surfeit of nutrition," as the trypanosomes live in a rich nutritive medium, namely blood.

The paper is illustrated by 69 figures. H. B. F.

CHATTERJEE (Gopal Chandra). **A Culturable Free Living Flagellate and the Determination of the Lethal Value of Certain Chemicals thereon.**—*Indian Jl. Med. Research*, 1914. Oct. Vol. 2. No. 2. pp. 594–603. With 1 coloured plate.

The organism was found while making a routine examination of a sample of water collected from a tank [in Calcutta ?]. The flagellate grew in ordinary bouillon and peptone water, and could be transplanted from day to day to fresh media. It is stated to possess "two flagella, a rudimentary undulating membrane, one nucleus, one blepharoplast and basal granules." It shows marked pleomorphism when cultivated in different media. In normal saline solution it multiplies and is more active than in bouillon, "but it becomes much shrunken and no undulating membrane can be made out." A fully developed form measures 16μ to 20μ in length and 4μ in breadth; "the upper flagellum is 5μ, the lower flagellum 10μ." Anteriorly there is a depression forming a cytostome and cytopharynx. Some of the flagellates, as seen in tap-water, are spherical, measuring 7μ in diameter. Some are very small, being only 3μ to 5μ in diameter. The organism is stated to multiply more vigorously at blood heat than at 18° to 20°C.

The author adopted the procedure for the Rideal Walker test for determining bactericidal value of chemicals. The substances tested included cyllin, lysol, potassium permanganate, quinine hydrochlorate dissolved in dilute hydrochloric acid, quinine bihydrochlorate dissolved in distilled water, carbolic acid, and hydrochloric acid.

Lastly, the author attempts to determine the systematic position of the flagellate and places it in the "sub-family" Trypanoplasma. He states that it is "quite possibly a new species." [Apparently he considers that a rudimentary undulating membrane is present. This organella, however, is not described in the paper, and certainly does not appear to be present from an examination of the figures on the plate accompanying the paper. The figures certainly suggest that the flagellate belongs to the genus Prowazekia, members of which are known to occur in cultures from human faeces, human urine, and the slime on stones at the biological station of Lunz. It is to be regretted that the study of the organism was not made in collaboration with a protozoologist. The author should have read the paper by SINTON on *Prowazekia urinaria* (see this *Bulletin*, Vol. 1, p. 158), wherein a good general account of such organisms is given].

H. B. F.

SEIDELIN (Harald). **Klossiella sp. in the Kidney of a Guinea-pig.**—*Ann Trop. Med. & Parasit.* 1914. Dec. 15. Vol. 8. No. 3. pp. 553–564. With 2 plates.

A parasite of the renal epithelia of mice in Massachusetts was described in 1889 and further studied in 1902, being named *Klossiella muris* by SMITH and JOHNSON. It belongs to the Coccidia. The parasite of guinea-pigs is very like it.

The organism was found by the author in the kidneys of two guinea-pigs which had been purchased locally and used for yellow fever research at Yaba near Lagos, Nigeria. "The cells mostly affected are the epithelia of the convoluted tubules of the first order, but also those of the second order and the straight tubules in the loops of Henle are sometimes the seat of the parasites." In addition, the kidneys showed marked necrobiotic changes of the epithelia, especially in the convoluted tubules. Many tubules and some Bowman's capsules contained granular exudates, and there were some irregular patches of hyperaemia. The various forms of the parasite occur in the epithelial cells. There appears to be a double division, first into sixteen to twenty, then into thirty daughter forms.

The first division is described as schizogony, whilst it is undecided whether the second division is schizogonic or sporogonic.

In conclusion the author compares his parasite with *Klossiella muris*. The number of daughter forms appears to differ. The name *Klossiella cobayae* is proposed for the parasite of guinea-pigs.

The various stages are illustrated in the two plates, one of which consists of microphotographs.

H. B. F.

ACTON (Hugh W.) & KNOWLES (R.). **Studies on the Halteridium Parasite of the Pigeon,** *Haemoproteus columbae,* **Celli and San Felice.**—*Indian Jl. Med. Research.* 1914, Apr. Vol. 1. No. 4. pp. 663–690. With 5 coloured plates.

This long, interesting and well illustrated paper is divided into three parts. In the first portion the life-cycle of *Haemoproteus* (*Halteridium*) *columbae* in the vertebrate host, a pigeon, is described. The second part is devoted to a study of the gametes. The last section records the results of the cultivation of the Halteridium parasite of the pigeon in vitro by BASS's method. A fourth part, dealing with the extra-corporeal cycle of the protozoon in the *Lynchia* fly, is promised later, in collaboration with Mrs. ADIE.

The authors state that: "The description [of the Halteridium parasite in the pigeon] given by BEAUREPAIRE-ARAGAO (1908) is misleading; whilst that given by NEGRI (1913) is only correct for the mature schizont stage. The figures given in DOFLEIN after LABBÉ are inaccurate and, in our opinion, represent the life-cycle of the Proteosoma parasite. The details of the asexual cycle of the Halteridium parasite are puzzling; but we believe that the description given below is accurate in its essentials." [The paper by NEGRI was summarised in this Bulletin, Vol. 2, p. 56.]

In the space available it is quite impossible to give a full summary of the paper. The authors themselves summarise each section at length, and the following extracts are taken from their summaries. [The portions omitted are chiefly repetitions.]

Part I. :—

"(1) The asexual cycle is, for a very short time, confined to the erythrocytes. The young trophozoites then escape from the erythrocytes and have an extra-cellular cycle of development in the lung capillaries.

"(2) Gametes are resistant and long-lived forms, produced from merozoites.

"(3) Merozoites infecting red blood cells give rise to either schizonts or to gametes. This depends upon the favourable or unfavourable environment present in the tissues of the host. In the lung capillaries, where conditions are favourable, schizonts are produced ; in the peripheral blood, where, perhaps, conditions are less favourable, gametes are formed.

"(7) The development of the asexual cycle in the lung causes inflammation and hypertrophy of the lining of the alveoli, and is probably a predisposing cause of pneumonia."

Part II. :—

"(1) Gametes diminish in number in those infected pigeons which are supplied with abundance of food and kept under good hygienic conditions. The practical importance of this observation is that the infected feeding grounds for the fly are diminished both in area and in intensity for the next season's epidemic.

"(2) The gametes have a very prolonged life. If an infected pigeon be killed and the lungs examined, it is found that the asexual cycle in the lungs is only present in those pigeons which show young gametes in their peripheral circulation. Where young gametes have been absent for some days from the peripheral circulation the asexual cycle is absent from the lungs. This is further confirmed by our venesection experiment. Mechanical removal of parasites by this method causes a permanent decrease in the number of parasites in those pigeons in whom the asexual cycle is absent. On the other hand, where the asexual cycle is still persisting the temporary reduction which occurs is followed in 10 to 15 days' time, by a further output of new gametes.

"(5) The determination of sex in the gametes is probably according to the Mendelian law; the female being the dominant and the male the recessive character.

"(6) The destruction of gametes occurs in the spleen by the agency of the mononuclear leucocytes; and it is particularly the young gametes which are phagocytosed.

"(7) Gametes, being resistant forms, with a prolonged life-history, are the means by which the parasitic race is preserved from annihilation during the winter months which elapse between one fly season and another."

Part III. :—

"(1) Female gametes can be kept alive for 64 hours when grown *in vitro* by Bass's method.

"(2) Male gametes readily die off when separated from the body of their host.

"(3) Trophozoites are found in cultures made from the peripheral blood which contains mature gametes only.

"(4) Fragmentation ot the chromatin of the female gametes is observed in such cultures, followed by budding which sets free merozoites.

"(5) The appearance of trophozoites in cultures from blood which contains only gamete forms (and of these gametes the males die off readily, whilst the females bud to form merozoites), shows that the trophozoites were derived from the female gametes.

"(6) This phenomenon may occur in the body of the host and be caused by external stimuli, e.g., changes in temperature, influence of toxins, etc., which, if their influence be not too strong or too prolonged, allow the gametes to partially recover and to bud before dying.

"(7) As the normal habitat of the schizont is a lung capillary, the trophozoites when implanted into erythrocytes do not mature into adult schizonts.

"(8) The evidence submitted is strongly in favour of the formation of trophozoites from gametes under certain circumstances and explains for these parasites the causation of a relapse, i.e., a return from sporogony to schizogony by a biological process comparable to the parthenogenetic phenomenon seen in metazoa."

[The author often referred to as C. F. CRAGG in the paper is the well-known American investigator, C. F. CRAIG.]

H. B. F.

THOMSON (J. G.) & FANTHAM (H. B.). **The Culture of *Babesia* (*Piroplasma*) *canis* in vitro.**—*Ann. Trop. Med. & Parasit.* 1913. Dec. 30. Vol. 7. No. 4. pp. 621–632. With 1 plate and 5 text figs.

The Successful Cultivation of *Babesia* (*Piroplasma*) *canis* vitro, following the Method of Bass.—*Trans. Soc. Trop. Med. & Hyg.* 1914. Jan. Vol. 7. No. 3. pp. 119–125. With 1 plate.

In these two papers, which are based on the same experiments, the authors state that cultivation of *Babesia canis* succeeded in two out of four attempts. The animals used were puppies about three months old. The technique employed was that of C. C. Bass in its simplest form, and was as follows :—

> "Ten cc. of heart blood, drawn with aseptic precautions, was mixed with 1 10 cc. of a 50 per cent. aqueous solution of Merck's glucose. The blood was carefully and gently defibrinated by means of a rod, and the clot was removed. It was noticed that the amount of clot removed was much in excess of that taken from a similar quantity of human malarial blood. The defibrinated blood was distributed into smaller tubes, placing about 1 inch of liquid in each tube. No centrifugalisation was necessary. The tubes were incubated at 37° C. The corpuscles settled to the bottom in a short time, leaving a layer of serum above.
>
> "Marked haemolysis was seen in all the cultures attempted. It was found advantageous to take the blood of the puppy before the crisis, that is, before too many parasites were present in the peripheral or heart blood.
>
> "No sodium citrate nor ascitic fluid was added to the cultures, as was done by Ziemann (1913), nor citrate and saline as used by Toyoda (1913)."

In the first culture, which was observed for 68 hours altogether, three divisions of the piroplasms occurred, the third division being completed in 48 hours. The second culture progressed more slowly, and two divisions were followed in 41 hours, the culture being observed for 66 hours altogether. The morphology of the various cultural forms is described at length and shown in text figures. All the phases of division by the mode of gemmation with chromatinic forking, characteristic of the genus *Babesia*, were followed. There was insufficient material for sub-cultures, though an animal was successfully inoculated with cultivated parasites.

The authors' summary is as follows :—

> "1. We have succeeded in cultivating *Babesia* (*Piroplasma*) *canis* in two out of four attempts, following the method of Bass, using blood and glucose, and incubating at 37° C.
>
> "2. In one of these cultures, starting with heart blood containing corpuscles infected with one, two or, exceptionally, four piroplasmata, we succeeded in obtaining a maximum of 32 merozoites in a corpuscle.
>
> "3. Various types of Babesia were seen in these cultures, namely, pyriform, amoeboid, rounded and oval parasites. Division of rounded forms was observed, following the method of gemmation with chromatinic forking. There was evidence, in stained specimens, of direct binary fission.
>
> "4. Haemolysis occurred in all the culture tubes.
>
> "5. A puppy was successfully inoculated from a 41-hours' culture and succumbed to piroplasmosis on the fifth day.
>
> "6. *Babesia canis* is not so easily cultivated by Bass's method as the malarial parasites of man."

The plate contains nine microphotographs of cultural parasites.

W. Yorke.

i. Chalmers (A. J.) & Archibald (R. G.). **Babesia or Piroplasma.**—*Jl. Trop. Med. & Hyg.* 1914. Nov. 2. Vol. 17. No. 21. p. 323.

ii. Leiper (R. T.). ***Babesia or Piroplasma : A Reply to Chalmers and Archibald.***—*Ibid.* 1915. Jan. 1. Vol. 18. No. 1. p. 7.

i. The authors find that the name *Piroplasma* should be used for the well-known genus of Protozoa to which the organisms causing redwater fever in cattle and malignant jaundice in dogs belong. While searching botanical literature they found that the name *Babesia* had been used by TREVISAN in 1889 for ellipsoidal cocci found in persons suffering from yellow fever and from erysipelas. The name *Babesia* was not applied to the protozoal organisms till 1893 by STARCOVICI. A list of synonyms is given. The generic name *Piroplasma* was given by W. H. PATTON in 1895.

ii. In reply to the proposal of CHALMERS and ARCHIBALD the author writes: "It appears to have escaped the authors' recollection that the first of the International Rules of Zoological Nomenclature stipulates that: '(1) Zoological Nomenclature is independent of Botanical.'"

Hence the generic name *Babesia* stands. H. B. F.

SANGIORGI (Giuseppe). **Reperto di "Corpi anaplasmasimili" nel Sangue dell' Uomo e degli Animali. (A Proposito della Natura dei Cosidetti "Anaplasmi.")** [Discovery of Anaplasma-like Bodies in the Blood of Man and Animals.]—*Pathologica.* 1915. Jan. 15. Vol. 7. No. 149. pp. 27–29.

This paper consists of an account of the various sources from which "Anaplasma," "marginal points" and "coccus-like bodies" have been recorded, together with a note on the occurrence of Anaplasma-like bodies found by the author in the splenic blood of a Catanian child infected with kala azar. He then discusses the different views held by various workers on Anaplasma as to whether these bodies are stages in the evolution of a piroplasm such as *Nuttallia equi*, the possibility of their connection with Toxoplasma and also the possibility that these Anaplasma-like bodies, marginal points or coccus-like bodies are cell inclusions or the products of nuclear decomposition of normoblasts. He inclines finally to the latter hypothesis.

H. B. F.

LAVERAN (A.). **Nouvelle Contribution à l'Etude du *Toxoplasma gondii.*** —*Bull. Soc. Path. Exot.* 1915. Feb. Vol. 8. No. 2. pp. 58–63. With 18 text figs.

The animals found sensitive to inoculation with *Toxoplasma gondii* were mice, field-mice (*Mus sylvaticus*), rabbits (chiefly by intravenous inoculation), guinea-pigs, moles, hedgehogs, dogs and padda birds. On the other hand, pigeons were only slightly sensitive, and rats, certain dormice, shrews, fowls, frogs and lizards were refractory.

In the present paper the author records his observations in detail on inoculation—usually intraperitoneally—of *T. gondii* from white mice into two dwarf mice (*Mus minutus*), three field mice (*Mus sylvaticus*), a Tunisian jerboa (*Jaculus orientalis*), two dormice (*Myoxus glis*) and two *Myoxus nitela*. All became infected except one of the *Myoxus nitela*, the other being only slightly infected. A shrew (*Sorex vulgaris*) did not become infected. A strain slightly virulent to the pigeon in 1913 has now, after numerous passages through mice, lost its virulence for the pigeon.

Regarding the morphology of the parasite the author considers that the organism divides only by binary fission and never by multiple fission. The nuclei of the host cells may not be easily stained, but yet are retained. The author could not find either a blepharoplast or a flagellum in any of the parasites.

Fatty degeneration of the liver occurs in the infected hosts.

Attempts at culture were unsuccessful.

H. B. F.

FANTHAM (H. B.) & PORTER (Annie). **The Morphology, Biology and Economic Importance of** ***Nosema bombi*****, n. sp., parasitic in Various Humble Bees (*****Bombus*** **spp.)**—*Ann. Trop. Med. & Parasit.* 1914. Dec. 15. Vol. 8. No· 3. pp. 623–638. With 1 plate.

The paper contains an account, with illustrations, of a new species of Nosema pathogenic to humble bees, which are essential for the pollination or fertilisation of the red clover in England.

The first four paragraphs of the author's summary are as follows :—

> "1. *Nosema bombi*, n. sp., is parasitic in the alimentary canal and Malpighian tubules of various species of humble (or bumble) bees, *Bombus agrorum*, *B. hortorum*, *B. latreillelus*, *B. lapidarius*, *B. sylvarum* and *B. terrestris* being affected. It may also pass naturally to the hive bee, *Apis mellifica*, and to *Apis florea*. It is pathogenic to all the above hosts.
>
> "2. The morphology of *N. bombi* resembles that of *N. apis* in its general outlines. The planonts are about 2·2μ in diameter. Meronts vary in size and in shape with the space in which they were formed. They are most abundant in the Malpighian tubules. The spores are oval, and average 5·2μ long by 3·7μ broad.
>
> "3. The mode of infection is contaminative, by means of infected food and drink. Larvae can become infected from the food soiled by the parental excrement, in which they hatch out.
>
> "4. *Nosema bombi* can pass from one species of humble bee to another without change of morphology or virulence. When it reaches hive bees its facies is preserved, but its pathogenic action is accelerated."

The remaining two paragraphs deal with economic importance and preventive measures.

A. G. B.

CHATTON (Edouard) & BLANC (Georges). **Existence de Corps Leishmaniformes dans les hématoblastes d'un Gecko Barbaresque,** ***Tarentola mauritanica*** **L. Gunth.**—*C. R. Soc. Biol.* 1914. July 31. Vol. 77. No. 27. pp. 430–433. With 1 text fig.

The authors, while working on the Commission of the Pasteur Institutes of Paris and of Tunis for the study of oriental sore, have examined certain geckos in an endeavour to ascertain whether there is a natural reservoir of the virus for the endemic leishmaniasis in the region of Gafsa. The geckos were examined on account of their promiscuous association with man, their presence in places where Phlebotomus swarmed and their insectivorous diet, which gave them the chance of becoming naturally infected with the intestinal flagellates of insects (cf. experiments of LAVERAN and FRANCHINI).

One gecko out of eight examined at Metlaoui contained a new parasite occurring only in its haematoblasts. The parasites took the form of small groups of elements in a vacuole, which occupied one of the poles of the corpuscle, whose nucleus was displaced towards the opposite pole. These elements were fusiform or with some resemblance to toxoplasms. A median nucleus and a blepharoplast were present, the latter being orientated as in Leishmania. The number in a group varies from 5 to 10, and the number of parasitised haematoblasts is not great. Attempts at cultures and of infection of the geckos, *Tarentola mauritanica*, with oriental sore are to be undertaken.

The Tarentola also contained a haemogregarine which the authors consider different from that described by BILLET in 1901 from the same lizard. It is larger, and enclosed in a cuticle formed by the periplast of the host cell. Binucleate and trinucleate forms have been seen, so that intraglobular schizogony with few merozoites occurs.

Trypanosoma platydactyli was present much more rarely in the geckos.

The small, new parasites are considered to be unconnected with the haemogregarine and trypanosome. All three forms are shown in the text figure.

H. B. F.

CHATTON (Edouard) & BLANC (Georges). **Sur un Hématozoaire Nouveau, *Pirhemocyton tarentolae*, du Gecko, *Tarentola mauritanica*, et sur les Altérations Globulaires qu'il détermine.**—*C. R. Soc. Biol.* 1914. Oct. 30. Vol. 77. No. 28. pp. 496–498.

This paper refers to the previous account given by the authors in July, 1914, and extends their observations to a new parasite. The parasite, named *Pirhemocyton tarentolae*, n.g., n. sp., was found in one gecko out of three from Matmata in May, 1914, and again in two out of about 40 from the district of Metlaoui, in July, 1914.

The presence of the parasite can be diagnosed in fresh blood by the appearance in the red cells of colourless, refringent spherical globules, usually one in each red cell, lying between the edge and the nucleus of the cell. These bodies represent a cytoplasmic alteration and a product elaborated by it under the influence of the parasite.

The parasites are only easily visible in stained preparations. Each is usually solitary and within the globular cytoplasm. At first it is a nucleated spherule, 1μ in diameter. By growth it becomes piriform, 3μ to 4μ long by 1·5μ to 2μ broad. The nucleus forms a band-like structure equatorially. The parasite presents analogies with the piroplasms. No evolutionary forms have been seen, and the mode of multiplication is unknown. No parasites have been observed free in the plasma, and no forms found in the organs other than those found in the circulating blood. Cultures on the N.N.N. medium have been negative.

Each parasitised globule contains a refringent inclusion, much larger than the parasite, 7μ to 8μ in diameter, which is homogeneous and cyanophile in stained preparations. They seem to be inert. No transition forms between them and the parasite have been seen.

Though the study of the parasite is still incomplete (the authors being on military service) the name *Pirhemocyton tarentolae* is given to the organism.

H. B. F.

Blier (Jules). L'Hémoglobinuria Bovine du Chile (Maladie à Parasites Spirochètiformes).—*C. R. Acad. Sci.* 1914. Dec. 14. Vol. 159. No. 24. pp. 815–817.

The author describes a bovine haemoglobinuria present in the Santiago region of Chili. The malady is seasonal, more frequent in February and March. The principal symptom is blood in the urine, accompanied by fever, exophthalmia, madness, vertigo, generalised icterus, expulsion of blood by the anus, and often bleeding gums. The illness evolves in 48 hours and usually ends in death. Five per cent. of the imported adult cattle are killed annually by it. It is less frequent in the rest of Chili than anthrax, with which it has been confused. This confusion is aggravated by the presence of symptomatic anthrax.

The lesions resemble those of yellow fever, the muscles and serosa being yellow; there is hypertrophy of the gall-bladder, the liver shows yellow degeneration, with haemorrhagic layers as large as a pea, in which the causal parasites are found. The spleen is also hypertrophied, there are profound alterations of the supra-renal capsules, subcutaneous haemorrhages and often a roseola on the diaphragm. To find the lesions, slaughter is necessary, as they disappear after natural death.

The organism found in slaughtered cattle recalls spirochaetes or spirilla, but differs in being more plastic which allows of considerable contraction. The parasite can reach 60μ long by 1μ broad. Shorter forms are inflated at the centre. One extremity is more pointed than the other. By staining with Borrel blue and eosin, deep red granules of a refringent nature are seen. A microphotograph has shown two flagella, one at each end, the flagella being unequal. The parasites recall those figured by the brothers Sergent, belonging to the provisional genus *Sergentella* of Brumpt.

These parasites have been proved to be the excitant of the disease by inoculation experiments. The incubation period is five to six days. The transmission of the disease is only possible at the commencement of the malady, as with yellow fever. A benign infection follows inoculation, but whether it confers immunity is not known, the experiments having been interrupted by the war. The organism has been found only in the lesions and has not been seen alive. A few recoveries have been recorded.

The transmitter of the malady is not known, but many breeders consider the Acarid Tetranychus to be the vector. This mite weaves webs on the herbage, and is ingested with forage. This idea has been contested, but it gives a name to the malady, "tela araña" (spider's web). The persistent rains of the Chilian autumn check the epizootic a little.

H. B. F.

Erdmann (Rhoda). A New Culture Medium for Protozoa.—*Proc. Soc. Experim. Biol. & Med.* 1914. Dec. Vol. 12. No. 3. pp. 57–58.

The author states that a satisfactory medium for the culture of trypanosomes on a slide under a cover glass has hitherto not been described. "The method here outlined makes possible the continued study of the life history of the organism either in prepared culture medium or in inoculated tissue." "As a culture medium the plasma of the host is employed and this is either inoculated with the trypanosomes themselves or used as a medium for the growth in vitro of various infected tissues of the host." Using rat plasma in studying *Trypanosoma brucei* the trypanosomes have been kept "in a normal condition for an indefinite period.'

The method used was as follows :—"The plasma was obtained by the method of HARRISON, BURROWS and WALTON, the latter making adaptations from mammalian plasma." "The blood from the infected rat was taken and put into a small drop of plasma on a cover glass and then this was further diluted with plasma in order to reduce the number of blood corpuscles in the hanging drop which was taken from this. The cover glass with the hanging drop was either placed on a depression slide or on a regular slide for study with dark field illumination." Similarly, "pieces of tissue were placed in plasma under a cover glass and sealed." Aseptic precautions were taken.

By this means many of the stages of trypanosomes described by various authors from the vertebrate and invertebrate hosts have been studied in vitro. The author considers that "this method may be employed not only for blood parasites but for all protozoan forms which are parasites in cells."

H. B. F.

MACFIE (J. W. Scott). **Notes on Some Blood Parasites collected in Nigeria.**—*Ann. Trop. Med. & Parasit.* 1914. Dec. 15. Vol 8. No. 3. pp. 439–468. With 2 coloured plates and 8 text figs.

The paper is divided into six sections :—

(1) Babesiasis of domestic animals in Nigeria.—Symptoms of disease were not marked and haemoglobinuria was never observed. Parasites were found in two Hausa cattle from Calabar, two dwarf cattle from Ikotobo, and 11 sheep from Lagos and Onitsha, forming 25 per cent. of the animals examined. The parasites may have been *Piroplasma mutans*; their morphology was like *Theileria parva*, but no Koch's bodies were seen.

One of the Hausa cattle from Calabar contained a Babesia with an unique morphology, which may have been a new species. One of the dwarf cattle had a double infection of a Theileria-like parasite and *Babesia bigemina*. The author remarks that in any attempts to improve the breed of domestic animals in Nigeria by introducing stock from Europe, it would be necessary to guard not only against tsetse-fly but also against "the tick that transmits babesiasis."

Paraplasma flavigenum and *Paraplasma cobayae*, n. sp., were found in guinea-pigs. The second species (*P. cobayae*) was "morphologically similar to the first, but differing from it especially in producing stippling of the red corpuscles. It was found frequently in the blood of stock guinea-pigs obtained from Calabar and Aro. Nothing is known as to its pathological significance."

(2) A Spirochaete isolated from the blood of a guinea-pig.—The parasite was observed in a culture of heart blood (to which glucose had been added) of a guinea-pig at Lagos. The parasites were 2μ to 9μ long, except two specimens which were 14μ. The ends were usually blunt. The organism differs from that found by De GASPERI (1912) in a culture of heart blood in guinea-pigs.

(3) Bacilliform bodies found in the red corpuscles of a rat. The bodies measured 1μ by 0·25μ. They occurred only in normally stained red cells. The author thinks that "the bodies were the same as those originally described by Graham-Smith, and subsequently named *Grahamella* by Brumpt."

(4) A disease of fowls characterised by inclusions in the leucocytes.—This was observed in five fowls from Eket and Ikotobo during November and December, 1913. The symptoms somewhat resembled those of fowl spirochaetosis, but no spirochaetes were seen. "In every case leucocytes were found enclosing chromatic granules and rings of a type that did not occur in the blood of healthy fowls." "No ticks were found on the fowls, but only a few minute red mites on the skin under the wings."

The disease is inoculable. It was exceedingly acute and death usually occurred within two days. "It is suggested that these cell inclusions were the specific cause of the disease."

(5) Blood parasites of lizards and toads.—The lizard was *Agama colonorum*, and the toad was *Bufo regularis*. Out of 38 lizards 15 were parasitised, and of 28 toads 12 were parasitised. Multiple infections were common.

Among the parasites of lizards were trypanosomes, filarial embryos (slender and stumpy), small dumb-bell shaped bodies associated with the microfilariae, haemogregarines (endoglobular and free), leucocytogregarines and haemocystidia.

In the toads were found trypanosomes (*T. mega*, *T. rotatorium* and another possibly new), filarial embryos without a sheath, and haemogregarines.

(6) The occurrence of a spirochaete in the gut of *Glossina tachinoides*.—Tsetse-flies were dissected at Ikotobo in December, 1913. "In the lower half of the gut of one *G. tachinoides*, a female, innumerable spirochaetes were found. The fly had been fed for some days on a clean guinea-pig, but although the blood of this animal was repeatedly examined, no spirochaetes were ever found in it." Long forms measured 15μ to 35μ, and short ones 7μ to 10μ. The extremities were blunt. The organism seems to be different from *S. glossinae* found by Novy and Knapp (1906) in the stomach of *G. palpalis*.

H. B. F.

Castellani (Aldo). **Note on two Protozoal Organisms.**—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal. Saigon* (1913). 1914. pp. 113–118. Witb 2 plates.

The first organism described is an "intestinal protozoal parasite producing dysenteric symptoms in man." The parasite was seen in three cases in Ceylon. In each case the dysentery was mild. The organisms were examined in fresh and stained preparations. They were elongate motile bodies. No flagella or cilia were seen. No distinct nucleus was observed, though in some stained preparations "a large mass of chromatoid, roundish granules are seen." Nothing is known of their reproduction, and attempts at cultivation failed. The zoological position of the organisms is uncertain. Dr. S. C. Paul has named them *Castellania castellanii*. The author thinks that the parasite "probably represents a new genus and species."

[Apparently the organisms described are the same as those discussed at a meeting of the Society of Tropical Medicine and Hygiene held in London on May 15th, 1914. On that occasion, Dr. G. C. Low exhibited, on behalf of Dr. Castellani, a stained specimen of an organism which Dr. Castellani had termed an Entoplasma. See *Transactions of the Society of Tropical Medicine & Hygiene*, Vol. 7, pp. 216–218, with 1 plate.]

The second parasite is described as " Protozoa-like bodies in a case of protracted fever with splenomegaly." It is now known as *Toxoplasma pyrogenes*, having been found in a Sinhalese boy. See this *Bulletin*, Vol. 3, pp. 521–522, with illustrative figures.

H. B. F.

SLEEPING SICKNESS.

NYASALAND PROTECTORATE. **Sleeping Sickness Diary.** [HEARSEY (H.), Principal Medical Officer.] 1914. Dec. 31. Part 24. 8 pp. Zomba: Government Printer.

This Diary is dated December 31st, 1914. Between the end of the previous May and this date 19 cases of sleeping sickness have been notified, bringing the number of recorded cases to 211. Eight were found in the sleeping sickness area of the Dowa District, nine in the Marimba District, which adjoins it on the north, and two in districts to the south. An account of these cases is given. One was the father of two previous cases (males). The dates on which trypanosomes were found were April 17th and July 7th; for the third (? intermediate) case no date is given. All these lived in the same hut. The numbers diagnosed might have been greater, but owing to the outbreak of war investigations were suspended in three of the districts at the end of July and in the remaining district early in October. It is stated that in the Proclaimed Area of the Dowa District there is now a cleared area of varying extent round every village in the fly area; "in most the result has been excellent." Clearings were also made along one of the main roads and on some lesser roads.

A. G. B.

NORTHERN RHODESIA. [**Tours in Sleeping Sickness Areas in Northern Rhodesia.** DRS. G. W. ELLACOMBE, H. LEACH.] MS. Received by the British South Africa Company, January 27th. 1915.

Dr. Ellacombe visited Ndola, on the Rhodesia-Katanga Junction Railway near the Congo border, in September, 1914, to enquire into deaths which had been reported; it was in this neighbourhood that a European was infected with trypanosomiasis two years previously. He palpated 1805 natives and detected three cases, trypanosomes being found in one instance in the blood, in another in a gland and in a third in both situations. Fly were scarce but general, in every instance *G. morsitans*. Many villages were visited. Notes on other diseases met with are added.

Dr. Leach visited Kakumbi's village, in the Loangwa valley on the route between Fort Jameson and Serenje. Of 123 natives examined two were found to be infected. The disease was known to the natives as "mallali" and six persons were reported to have lately died of it. Other villages were therefore visited and a total of 392 persons examined. Ten cases in all were detected, a percentage of about 2·5; all lived within a short distance of the Loangwa; fly was scarce. The diagnosis was made as a result of gland examination in three instances, blood in three, and both in one. One patient was "an ancient man; thin, shrivelled, doddering; a picture of extreme old age." Two others are described as old. Most were said to have "mallali." In this disease persons "become thin and weak. After a time their feet and lower part of their legs would swell and they would be unable to walk. Their bellies would swell. They might eat a great deal or very little. They preferred to lie in a hut and sleep rather than be outside and they lost interest in local affairs." The majority of cases were chronic. Reckoning cases that had died and early undetected ones Leach would put the percentage at 5 rather than 2·5. The disease here is believed to be recent.

[The Native Commissioner of Petauke has given an account of a disease called "chilotera" in the Loangwa valley, which corresponds in some respects to the account quoted above (see *Sleeping Sickness Bulletin,* Vol. 3, p. 276); it is said to have been long known in the valley. There is a natural tendency to assume that cases of human trypanosomiasis contracted in *morsitans* areas south of 12° S. are all attributable to *T. rhodesiense* (or *T. brucei*). The symptoms described by LEACH are suggestive of *T. gambiense* rather than the other infection and, seeing that *G. morsitans* is under laboratory conditions an efficient transmitter, there is no valid reason why the two forms of the disease should not exist side by side. They cannot be distinguished with certainty without inoculation of animals].

A. G. B.

SUDAN SLEEPING SICKNESS COMMISSION. **Annual Report on Sleeping Sickness for the Year ending September 30th, 1914.** [Dr. H. BRAY]. **MS.**

Among the changes of staff one notes the death of Captain H. S. RANKEN, V.C., Senior Medical Officer at Yei; a report by Captain RANKEN, and an account of his treatment of sleeping sickness patients by metallic antimony were summarised in the *Bulletin* (Vol. 1, pp. 507 and 663). It is noted that the Yei sleeping sickness camp had an average strength of 383 throughout the year, but is not now the centre of the most heavily infected district; there were only 24 admissions, against 140 the year before. Selected cases receive passes to visit their villages for periods within one month. It is still necessary to employ human carriers on the Rejaf-Libogo road as other forms of transport are insufficient. The Kajo-Kaji district is now the most heavily infected; villages 18 miles south of this place (on the Nile, nearly opposite Nimule) contained most of the cases. A new camp is being built in this region, to take 300 patients. The villages will be shifted.

Three cases were found in the Nimule district (South Eastern Mongalla). It is believed that there are others. [When the reviewer was stationed at Nimule in 1901–02 an old Sudanese soldier attended the dispensary with obscure nervous symptoms which the reviewer has since recognised as those of sleeping sickness. He has little doubt that this man was in an advanced stage of the disease.] Details are given of the precautions on the borders of French and Belgian Congo, within which are many infected cases. It is noted that 90 per cent. of immigrants avoid the inspection post at Raga and enter elsewhere. An additional medical post is recommended. The expenditure on sleeping sickness prevention in the last year was £5,520. Details of the work done at Yei camp and district are given by Captain J. T. SIMSON.

Aubert (P.). Essais de Traitements de la Trypanosomiase Humaine avec un Dérivé O₁ du Diaminoarsénobenzène.—*Bull. Soc. Path. Exot.* 1915. Feb. Vol. 8. No. 2. pp. 74–77.

The author at Brazzaville has employed O₁ in the treatment of human trypanosomiasis [this *Bulletin* Vol. 4, p. 258]. It was given intravenously, in one in thirty parts of distilled water, to seventeen patients, fifteen of whom had not had previous treatment; the state of nine patients is described as *assez bon*; the others were less favourable cases. The results are shown in a table, in which it is seen that the longest period of freedom from trypanosomes to date was 88 days. The smallest dose capable of driving the trypanosomes from the glands and peripheral circulation was 1–1·5 cgm. per kilo. Doses of 3 cgm. per kilo were badly borne, causing nausea and vomiting, and these symptoms were called forth more often by a second than by the first dose, though the interval was 24 to 38 days. The weight did not go up, as it is observed to do after atoxyl treatment. Five of fifteen cases in which the blood was examined by centrifugation had a relapse a short time after treatment. Three of these had received the dose shown above to be toxic. [The results so far obtained with this product do not show that it has any advantages over arsenophenylglycin.]

A. G. B.

i. Aubert (P.) & Michelli (M.). **Essais de Traitement des Infections Expérimentales à *Trypanosoma gambiense* et *dimorphon* avec des "Suspensions Huileuses d'Arsenic et d'Antimoine" (Métoléine). Note Préliminaire.**—*Bull. Soc. Path. Exot.* 1915. Jan. Vol. 8. No. 1. pp. 28–30.

ii. Laveran (A.). **Le Dérivé O₁ du Diaminoarsénobenzène dans les Trypanosomiases du Chien et du Cobaye.**—*Ibid.* pp. 31–32.

iii. Mesnil (F.) & Motais (F.). **Sur l'Action Trypanocide *in vivo* d'un Dérivé (OK₁) du Diaminoarsénobenzène.**—*Ibid.* pp. 32–34.

i. Under the name "Métoléine," Deguy and Lesure have recommended the employment of finely pulverised metals or metalloids in oily suspensions which can be introduced into the organism intramuscularly. The authors have tested a small quantity of these substances—arsenic metolein, which contains 8 per cent. of arsenic, and antimony metolein, which contains 20 per cent. of antimony. In the first series of experiments two guinea-pigs infected with *T. gambiense* were treated with arsenic metoleine; in the second two guinea-pigs infected with *T. dimorphon* were treated with antimony metoleine; a guinea-pig was left untreated as control in each case. The details are given. It was concluded that in these cases there was a marked trypanocidal effect, that there was no reaction at the site of injection, that the particles of the metals were taken up by the large mononuclears, the process beginning about the fourth day after injection. Absorption was very slow; in one guinea-pig almost the whole of the arsenic was found in the tissues 96 hours later.

ii. The author and Roudsky published in 1914 the results of the treatment of mice infected with various species of trypanosomes with the derivative O₁ [this *Bulletin*, Vol. 4, p. 258]. In the experiments here described five dogs infected with *T. congolense*, *T. gambiense*, and *T. soudanense* were treated with intravenous injections of this substance. Of three dogs infected with *T. congolense* two recovered after six to eight injections and were well five months later. The third dog succumbed after a "prolonged survival." In the dogs infected with the other trypanosomes the improvement was only temporary. It was noted that the doses used were small. In the case of guinea-pigs injected under the skin or in the muscles, there were severe local symptoms so that the experiments could not be followed up. However, in one case a rabbit infected with a strain of *T. gambiense* refractory to atoxyl was treated with this substance and the trypanosomes disappeared for 57 days.

iii. This paper deals with another derivate of diaminoarsenobenzene, OK1 prepared by OECHSLIN. The experiments were interrupted by the outbreak of war. The substance is a yellowish powder which keeps well in air and is very soluble in distilled water. Subcutaneous inoculations were well borne. Several mice infected with *T. brucei* and *T. gambiense* were treated and recovered; the dose employed was one half the lethal dose. The same results were obtained with the same doses of arsenophenylglycin. Experiments were then tried on rats, in which infection is more difficult to overcome. The trypanosome was *T. gambiense.* The rats had not relapsed at the end of the month, when they were killed. The same results were obtained with arsenophenylglycin. The experiments show that this product is not inferior to arsenophenylglycin and is superior to it in its stability in contact with air. Only experiments on man can tell if it can be substituted for arsenophenylglycin. OK1 was shown to be active in mice on *T. rhodesiense* resistant to atoxyl.

A. G. B.

LAFONT (A.) & DUPONT (V.). **Action comparée, *in vivo*, chez le Rat Blanc, de l'Atoxyl, du Salvarsan, du Néosalvarsan, du Galyl et du Ludyl sur *Tr. gambiense* et *Tr. rhodesiense*.**—*Bull. Soc. Path. Exot.* 1915. Jan. Vol. 8. No. 1. pp. 37–46.

The experimental animal was the white rat, of which 115 were used, 69 infected with *T. gambiense* and 46 with *T. rhodesiense.* Five or six animals were inoculated at a time and the arsenicals were introduced subcutaneously as soon as parasites were very numerous in the blood. The life duration of untreated rats was ascertained to be 12 days for *T. gambiense* and 10 for *T. rhodesiense.* The protocols of the experiments follow. If the minimum dose required to cause the definitive disappearance of parasites be considered the sterilizing dose, the following table shows the results :—

	T. rhodesiense.	*T. gambiense.*
Atoxyl ..	Above 20 cg. per kg. ..	From 15 to 18 cg. per kg.
Salvarsan ..	From 1 cg. to 1·5 cg. per kg.	From 0·75 to 1 cg. per kg.
Neosalvarsan	From 1 cg. to 1·5 cg. per kg.	From 1 cg. to 1·5 cg. per kg.
Galyl	From 0·75 to 1 cg. per kg...	From 0·50 to 0·75 per kg.
Ludyl ..	From 1·5 to 2 cg. per kg. ..	From 0·75 to 1 cg. per kg.

It is seen that *T. rhodesiense* is a little more resistant to the arsenicals than *T. gambiense*; that the arsenobenzenes are 10–15 times as active as atoxyl, whereas their toxicity is only one-and-a-half to twice as great; and that of the four arsenobenzenes galyl is the most active. In order to make sure of this last point another series of experiments was performed. These showed that whereas a certain dose of salvarsan, neosalvarsan and ludyl did not lead to the disappearance of *T. gambiense* from rats' blood, the same dose of galyl banished them from four to eight days; moreover, the period of survival in the case of galyl was greater than in that of the other three drugs. The authors favour further experiments, especially with galyl, with a view to its employment in human sleeping sickness.

[These authors have already recorded such employment; see this *Bulletin*, Vol. 3, p. 410, and Vol. 4, p. 257.]

A. G. B.

SEIDELIN (Harald). **Experiments with Salvarsan-Copper in Trypanosomiasis.**—*Ann. Trop. Med. & Parasit.* 1915. Mar. 18. Vol. 9. No. 1. pp. 197–200.

Salvarsan-copper (K_3) was tested on white rats, infected with a strain of trypanosomes of the *T. brucei* group kept in guinea-pigs and rats in West Africa. The best results were obtained with the injection of a dose of 0·0064 gm.; in such a case the trypanosomes disappeared from the blood on the following day and remained absent for 15 days, death occurring on the 28th day; in several other cases the life of the animals was prolonged for a few days more. It appeared probable that repeated injections of smaller quantities would have given better results. The author's object was to see if a real *Therapia sterilisans magna* could be established; in this he failed. A larger dose led to the death of the animals. The stage of infection at which treatment was undertaken proved to be of little importance. The experiments and their results are shown in a table. Untreated animals infected with this strain died in from eight to 17 days. The greatest period of survival in the experiments seems to have been 33 days. Reference is made to VANDENBRANDEN's paper on the use of this drug in human trypanosomiasis [see this *Bulletin*, Vol. 3, p. 167].

A. G. B.

SERGENT (Edm.), LHÉRITIER (A.) & LANDES (L.). **Absence d'Immunité Héréditaire à l'Egard du *Trypanosoma soudanense* chez un Chevreau né d'une Chèvre immunisée envers ce Trypanosome.**—*Bull. Soc. Path. Exot.* 1915. Feb. Vol. 8. No. 2. pp. 73–74.

This paper is complementary to that of LAVERAN, who showed that kids born of goats immune to *T. evansi*, the trypanosome of debab, *T. congolense*, and *T. gambiense*, were not themselves immune to these trypanosomes [see this *Bulletin*, Vol. 5, p. 99]. A goat immune to *T. soudanense*, after an infection of eight months, gave birth to a kid. This kid was inoculated two-and-a-half months later, contracted an infection of the same duration as its mother, and like her acquired immunity.

A. G. B.

VIALATTE (Ch.). **Au Sujet d'un Trypanosome du Chien observé dans le Sahara Oranais.**—*Bull. Soc. Path. Exot.* 1915. Feb. Vol. 8. No. 2. pp. 70–72.

Reports were received of the occurrence of an undetermined disease among dogs, with fatal termination, at Beni-Abbès in South Oran. Later, the author himself observed a case and found trypanosomes therein. Some of the symptoms were intermittent fever, emaciation, paralysis of the hind quarters and opacity of the cornea. The number of trypanosomes found in the blood varied at different times.

The trypanosome averaged 18μ in length, varying between 17μ and 24μ. Its breadth was 1·5μ to 2μ. The free portion of the flagellum was as 3μ to 5·5μ long.

Debab in dromedaries is enzootic in the region. Morphologically, the trypanosome found in the dog closely resembled *T. soudanense* var. *berbera*, the causal agent of debab.

Various experiments are in progress to determine the identity of the trypanosome.

H. B. Fantham.

MINCHIN (E. A.) & THOMSON (J. D.). **The Rat-Trypanosome, *Trypanosoma lewisi*, in its Relation to the Rat-Flea, *Ceratophyllus fasciatus*.**—*Quarterly Jl. Microscop. Sci.* 1915. Jan. Vol. 60. Pt. 4. No. 240. pp. 463–692. With 10 plates and 24 text figs.

This interesting and detailed memoir of 230 pages gives a fully illustrated account of the authors' work—extending over five years—on the life-cycle of *Trypanosoma lewisi* in the rat flea. Previous papers on the subject have already been reviewed in this *Bulletin*, and as it is quite impossible to give an adequate summary of the memoir in the space at disposal, it must suffice to indicate the chief sectional headings.

The memoir is divided into three parts—"introductory," "the development of *T. lewisi* in the flea," and an "experimental study of the problems of transmission and development." The headings of the sections of the last part form an instructive and useful summary, thus:—

"(I.) *Trypanosoma lewisi* is transmitted from rat to rat by the rat-flea, *Ceratophyllus fasciatus*.

"(II.) The transmission takes place by the cyclical method. Transmission by the direct method has not been proved to occur.

"(III.) The trypanosomes make their appearance in the blood of the rat five to seven days after infection; the multiplication of the trypanosomes in the blood of the rat comes to an end 11 to 13 days after infection.

"(IV.) The cycle of development in the flea requires a minimum of five days for its completion.

"(V.) Transmission is never effected until the developmental cycle is completed; that is to say, until at least five days have elapsed since the first exposure of the fleas to infection.

"(VI.) The infection of the rat is brought about by the small trypanosome-form, which is the final form of development.

"(VII.) The final infective form of the cycle is developed first in the rectum on the fifth day of the developmental cycle, but may appear later in the stomach.

"(VIII.) The developmental forms of the trypanosomes in the flea are not infective when inoculated into the rat during a period extending from a short time (half-an-hour ?) after being taken up by the flea until the developmental cycle is complete.

"(IX.) The flea, when once it has become infective, remains so for a considerable length of time.

"(X.) The trypanosome does not penetrate into the salivary glands of the flea, but is confined, during its whole development, to the digestive tract.

"(XI.) The rat can become infected by eating infected fleas, but not until the developmental cycle of the trypanosome in the flea is completed.

"(XII.) Infection of the rat is effected contaminatively, by way of the rat's mouth, by the rat licking from off its fur or skin the moist faeces of infective fleas containing the final propagative form of the cycle.

"(XIII.) Can the flea infect the rat by inoculating the trypanosomes into it through the proboscis ? [The authors' answer is in the negative.]

"(XIV.) Hereditary transmission of the trypanosome from flea to flea does not, in our experience, take place.

"(XV.) The trypanosomes in the blood of the rat can render fleas infective very soon after they make their first appearance in the blood, before their multiplication period is over.

"(XVI.) The trypanosomes succeed in establishing themselves in the flea and rendering it infective to the rat in only a small proportion of the fleas (*Ceratophyllus fasciatus*) that ingest them.

"(XVII.) Can the first phase of the development of the trypanosomes, namely, the intra-cellular multiplication in the stomach of the flea, continue beyond the second feed of the flea (counting as the first feed that by which it became infected) ? [The answer to this question must remain open, so far as the authors' experiments are concerned.]

"(XVIII.) Starvation of the flea during the incubation period of the cycle does not inhibit, nor does it necessarily retard, the developmental cycle of the trypanosome in the flea.

"(XIX.) Starvation of the flea following immediately on an infective feed favours the establishment of the haptomonad [attached crithidial] phase in the rectum, while starvation begun after the incubation period in the flea is over, favours migration to the post-pyloric end of the intestine and the establishment of the haptomonad phase there."

There are also notes on the histological structure of the stomach of the flea and on various parasites of fleas.

The trypanosomes parasitise the fully formed, but still young and vigorous, cells lining the flea's stomach. The flagellates were not found within the cells of the epithelial crypts of that organ. As the parasitised cells become exhausted and destroyed they tend to be thrown off from the epithelium

The last plate consists of a diagram of the life-cycle of *T. lewisi* in the rat flea.

H. B. F.

Delanoë (P.). Au Sujet des Trypanosomes du Type *T. lewisi* Kent rencontrés chez des Muridés dans la Région de Bouaké (Côte d'Ivoire).—*Bull. Soc. Path. Exot.* 1915. Feb. Vol. 8. No. 2. pp. 80–88. With 2 plates.

The author has examined recently 600 rodents captured in the neighbourhood of Bouaké, Ivory Coast. In the present paper he describes three new trypanosomes.

1. *Trypanosoma arvicanthidis* (called *T. arvicanthi* in the earlier part of the paper), a variety of *T. lewisi.* The flagellate was found in striped rats, *Arvicanthis barbarus* and *Arvicanthis barbarus pulchellus.*

Fifty-three of these rats were examined, and seven were found to be infected. *T. arvicanthidis* averages 28μ in length (varying between 25μ and 31·5μ) and 1·8μ in breadth (varying between 1·2μ and 2·5μ). The free portion of the flagellum averages 6μ. The parasite can only be inoculated into young rats with difficulty. It is inoculable into "rats savanes," allied to *Arvicanthis niloticus richardi.* Two young *Golunda campanae* were successfully inoculated, but a young guinea-pig was refractory. The parasite may be allied to *T. avicularis* found by WENYON in a striped mouse in the Anglo-Egyptian Sudan.

2. *T. eburneense,* n. sp., found in the blood of *Mus concha.* Nine of the rodents were found to be infected out of 66 examined. Of 36 parasites measured the average length was 34·9μ. The trypanosome appears to be pathogenic to its natural host. *Golunda campanae* are inoculable, but white rats are refractory. A young guinea-pig inoculated intraperitoneally showed infection limited to the peritoneum. Three young *Xerus erythropus* were successfully inoculated.

3. *T. guist'haui,* n.sp., found in "rats savanes" [*Arvicanthis sp.*]. 128 of these rats were examined and 16 were found to be infected. The trypanosome was somewhat rare in the parasitised animals. Of 10 trypanosomes measured the average length was 44·7μ.

The various trypanosomes found are represented in two plates.

H. B. F.

ROUBAUD (E.). **Sur un Essai d'Élevage de Glossines dans les Laboratoires d'Europe.**—*Bull. Soc. Path. Exot.* 1915. Jan. Vol. 8. No. 1. pp. 34–36.

In December, 1913, Roubaud brought to France from Senegal about twenty living pupae of *G. palpalis* and *G. morsitans.* The more mature were killed by the cold. From the rest a certain number of imagines emerged at the Pasteur Institute; Roubaud believes that these are the first to be introduced into Europe. [In December, 1909, a number of pupae of *G. palpalis* reached the Zoological Gardens, London, from Sir David BRUCE in Uganda. They were kept under not very favourable conditions. Two imagines emerged but did not survive (*Sleeping Sickness Bulletin,* Vol. 2, p. 46)]. They were placed in a Roux's incubator at 24–25°C. and fed every day on guinea-pigs or rabbits. The *palpalis* pupae produced two males only, the *morsitans* two males and six females. One of these formed the progenitor of twenty flies which existed a year later; that the number was no larger was attributed to the disturbance incident to mobilisation. The humidity was kept at 50–55 per cent. One fly lived 5½ months and produced 15 larvae. The pupation period in four cases was from 31 to 38 days. It is necessary to arrange for the renewal and circulation of the air in the incubator; for *G. morsitans* the percentage of humidity should not exceed 60. In June some of these flies were shown under glass at the Jardin d'Acclimatation in Paris. They were subject to the ordinary temperature, 10°–27°C., for more than a week. It appears then that they might survive in France through the summer months.

A. G. B.

Terry (B. T.). The Influence that Serum exerts upon Trypanosomes, with Special Reference to its Use for Experiments *in vitro* with Atoxyl and Paraminophenylarsenoxyd.—*Jl. Experim. Med.* 1915. Mar. 1. Vol. 21. No. 3. pp. 250–257.

The author published in 1912 a paper entitles "The Advantages for Certain Experiments *in vitro* of suspending Trypanosomes in Serum" (see *Sleeping Sickness Bulletin,* Vol. 4, p. 220). He now returns to the subject and adds to the points made in his former paper. His summary, which is a fairly complete account, is as follows :—

"1. Serum of various animals preserves the motility of nagana trypanosomes better and longer than salt solution.

"2. To act best in this way the serum should not be diluted more than two to four times. Undiluted serum is perhaps best.

"3. Serum filtered through a Berkefeld filter, bottled aseptically, and kept in the ice-box preserves this activating property apparently undiminished for many months.

"4. Serum preserves the motility of trypanosomes better than '*Salz physiologicum*' of Merck, and better than the Ringer solutions of Meltzer and Carrel.

"5. Serum preserves the normal morphology of trypanosomes better than the Ringer solutions tested.

"6. The infectiousness of trypanosomes suspended in cattle serum was preserved at room temperature for at least eight days.

"7. The vitality of the trypanosomes in serum was seemingly better preserved at room temperature than at ice-box temperature.

"8. Serum incubated with atoxyl does not transform it into a toxic substance.

"9. Serum does not bind paraminophenylarsenoxyd, for trypanosomes suspended in serum are often immobilized more quickly by paraminophenylarsenoxyd than trypanosomes suspended in salt solution.

"10. Serum is suitable for suspending trypanosomes for certain experiments *in vitro,* and with proper precautions may be employed for transporting virus from laboratory to laboratory."

A. G. B.

Schilling & Goretti. **Ueber die Wirksamkeit von Lösungen von Arzneimitteln in Serum.** [The Activity of Solutions of Medicaments in Serum.]—*Zeitschr. f. Immunitätsforsch.* 1. Teil. Orig. 1914. Dec. 19. Vol. 23. No. 3. pp. 257–266.

Schilling and Schreck made the following observation on a horse which had a relapse of nagana. Salvarsan was given intravenously in a quantity of 21 mgm. per kilo body weight. About a minute after the last of the salvarsan had gone through the funnel and the remains had been rinsed through with salt solution, blood was removed through the same canula. The serum obtained from this blood when mixed with trypanosomes of the same strain proved to be highly parasiticidal. Experiments were therefore made in Berlin. It was seen then that it was not necessary to introduce the drug into the blood of the living horse ; it was sufficient to use fresh horse serum as a solvent. Tartar emetic was employed. It was first dissolved in one per cent. salt solution and further dilutions were made with fresh horse serum. The technique is described. Decreasing quantities of tartar emetic were dissolved in fresh horse serum on the one hand and citrate bouillon on the other, and a suspension of *T. brucei* was brought into contact.

It was found that after three-quarters of an hour the trypanosomes in a 1:9,000 dilution of the drug in normal horse serum were quite immobilised, whereas in the control tubes, in which the tartar emetic was dissolved in bouillon, they were still completely motile. The experiment was then modified, the tartar emetic being dissolved in salt solution and the trypanosomes suspended in horse serum on the one hand and citrate bouillon on the other. A similar result was obtained. The authors say that the phenomenon can be very well observed if a drop of trypanosome suspension is brought in contact with a drop of tartar emetic plus serum, 1:3,000. The preparation is covered with a cover glass. Within a minute the trypanosomes begin to lose their movements and eventually they disappear. The phenomenon can be produced with inactivated serum also. The serum of cattle, goats and rabbits was not so effective as horse serum.

Experiments were then made to see if other drugs behaved similarly. With salvarsan, atoxyl and trypanred the effect was the same whether they were dissolved in citrate bouillon or in serum. It was found that serum mixed with an equal part of bouillon had a pronounced action; with greater dilutions the effect was less. The authors tested the serum of a foal which had been infected with nagana and freed from trypanosomes by injections of tartar emetic. The serum was protective for mice. In this series of experiments its parasiticidal property was not greater than that of normal serum, from which it may be inferred that the substance which killed the parasites in the mouse experiment is different from the substance which became active on the addition of tartar emetic. The authors find that tartar emetic dissolved in normal horse serum does not act better therapeutically than when dissolved in water or salt solution. They are unable to say how this heightening of the activity of tartar emetic comes to pass. They think the phenomenon has a certain relation to that observed by LEVADITI, who showed that an emulsion of liver cells mixed with atoxyl became parasiticidal *in vitro.*

A. G. B.

MISCELLANEOUS.

JAMES (S. P.). **Mosquito Work in Ceylon.**—*Trans. Soc. Trop. Med. & Hyg.* 1914. July. Vol. 7. Nos. 7 & 8. pp. 225–243.

Summary of a Year's Mosquito Work in Colombo.—*Indian Jl. Med. Research.* 1914. July. Vol. 2. No. 1. pp. 227–267. With a plan.

In the space at disposal it is difficult to give of this interesting paper the account which it merits.* The author was engaged by the Government of Ceylon to make a Stegomyia survey of her seaports, to study malaria in the island, and to assist in training a body of men to be employed as sanitary inspectors. He points out that active mosquito work must be preceded and accompanied by research, with a view to ascertain (1) the names of the species that are dangerous; (2) Distribution and prevalence of each species separately; (3) The life history and habits of each; and (4) The practical methods which, in view of the knowledge obtained under (1) to (3), will be most likely to bring about the reduction of the different species.

With regard to (1) 52 species were collected from Colombo alone—Stegomyia 5, Ochlerotatus 5, Culex 8, and Anopheles 8. Seventeen of the species were sufficiently prevalent to be a source of annoyance or danger, including four Stegomyia and Ochlerotatus, six Culex and three Anopheles.

With respect to prevalence and distribution, the author's experience was that the systematic enumeration of adults collected by hand catching in test tubes or in specially devised traps was the best method, and a great advance upon the usual practice of basing estimates upon an enumeration of breeding places. The description of a successful trap is as follows:—

> "It consists of a rectangular wood framework, 5 ft. long, 3 ft. deep and 3 ft. broad, closed with mosquito netting, one end of the trap being a door on hinges. We place these traps on the ground in the shady corner of a garden, and cover them with sacking and a thick tarpaulin, so that the interior is dark and cool. Two or three pots of plants are put inside each trap and several near the door, which is left partly open. We set the traps over night, and the next morning, about nine o'clock, we send beaters through the vegetation in the neighbourhood of the traps, and we burn straw torches in all the surrounding buildings so as to drive the mosquitoes into the open air. The result is that most of them quickly find their way into the traps, which appear to them to be very attractive and cool resting-places. After completing the disturbance of vegetation and the smoking of surrounding buildings we close the door of the trap, and collect and count the imprisoned mosquitoes."

A tabular statement is given of the number of mosquitoes caught daily for 23 days in one of these traps. The average daily catch was 280, and on one occasion the catch was 826. The trap for anopheles was a movable mosquito-proof hut, each wall of which was provided with a special trap similar to those used on the Panama Canal. For estimating the prevalence and distribution of *Stegomyia fasciata* test breeding pots were used. Of 168 pots distributed in March 14 per cent. became infected within 48 hours and 42 per cent. within 120 hours. The percentage of dwellings in which larvae are found being called the larval index for dwellings, the figure for *S. fasciata* was about 16, but this figure underestimates the real prevalence as many collections of water cannot be readily examined.

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* Those who wish to study the details of this survey should obtain the "Report on a Mosquito Survey of Colombo and the Practicability of Reducing Stegomyia and some other kinds of Mosquitoes in that Seaport," by S. P. JAMES, M.D., D.P.H., Major, Indian Medical Service. Assisted by W. T. De Silva, L.M.S., and E. W. Arndt, L.M.S. 64 pp. With 4 plans and 70 photographs. 1914. Colombo; H. C. Cottle, Government Printer, Ceylon. To be purchased at the Government Record Office, Colombo. Price, with Plans, &c., Rs. 2.

A study of the life history and habits of each species led the author to arrange the mosquitoes of Colombo in the following broad groups :—

(*a*) Urban mosquitoes—Group 1 strictly household species, Group 2 other urban species.

(*b*) Rural mosquitoes—Group 3 strictly sylvan, Group 4 migratory, Group 5 species with peculiar habits. Of Group 1 *Stegomyia fasciata* is the best example ; of Group 2, *Culex fatigans* ; Group 4, the migratory species are those which breed in swamps at a distance from centres of population and have the habit of flying long distances into towns to obtain meals of blood ; they include species of Culex and Anopheles. Some members of this group are of great interest and importance in Colombo. This migratory habit has been noted in the Panama Canal Zone and elsewhere. One of the members of Group 5 obtains its food from the mouths of ants.

As regards the practical methods of bringing about a reduction of the different species, five experimental anti-mosquito campaigns were initiated in different areas of the town. The author discusses the relative value of a scheme based upon legal powers and one carried out by voluntary action. A campaign of the latter kind is far more arduous and costly and meets with more opposition than a campaign based on legal powers. A thorough investigation was first made. The staff allotted to each area was frequently changed and independent investigations were held. For testing progress the following methods were employed :—

> "*For Larvae.*
>
> "(1) A continuous record of the number of potential and actual breeding places found in the areas at each investigation.
>
> "(2) A periodical comparison of the number of actual breeding places found inside the area, with the number found in a similar control area just outside it.
>
> "*For Adults.*
>
> "(3) The opinions of members of the community resident in the area dealt with as compared with the opinions of those occupying the control area.
>
> "(4) Enumerations of adult mosquitoes by hand catching and trap catching.
>
> "(5) The use of test breeding places."

A tabular record is given of the potential and actual breeding places found between April and December in one area. The author thinks that the system of frequent changes of staff and independent investigation is a great aid to the discovery of breeding places, and points out that in an anti-larval campaign steps have to be taken to overcome the frailty of man as well as the wiliness of the mosquito. He writes :—

> "One of our observations resulting from the institution of these precautions is of especial importance. It is that the elimination of breeding places which are easily accessible leads mosquitoes to discover places which are very difficult for ordinary human beings to find, and when

found are very difficult to destroy. This clever change in the habits of mosquitos greatly increases the difficulties of a campaign, and is one of the reasons why it is hardly possible, even for highly skilled workers, to exterminate mosquitoes, and why the brigades of voluntary untrained labour recommended in the popular books seldom effect a reduction in the number of adult mosquitoes, although they eliminate many of the more obvious breeding places."

A table shows that a diminished percentage of houses in which larvae were found in the area was accompanied by an increased percentage outside. From the middle of July it became difficult to collect specimens of *S. fasciata, S. scutellaris* and *C. fatigans*. Table 6 shows the reduction of *S. fasciata* as shown by the trap breeding pots.

TABLE VI.

Dates.	Percentage of test pots infected.	Dates.	Percentage of test pots infected.
25–7–13	41·6	13–9–13	12·5
30–7–13	33·3	18–9–13	8·1
4–8–13	33·3	23–9–13	4·1
30–8–13	29·1	30–9–13	8·1
4–9–13	17·0	6–10–13	4·1
9–9–13	17·0	—	—

In August, September and again in November a large number of migratory species entered the area so that the residents were obliged to resort to the use of curtains.

In conclusion, the author says that the task of reducing the mosquito pest and even *Stegomyia fasciata* must be regarded not as a trivial affair, but as a task of immense difficulty. He recommends for large seaports and cities the establishment of a special anti-mosquito department, consisting of a properly qualified entomologist and staff of trained workers provided with legal powers and liberal funds. Active measures must be accompanied by active investigation.

A. G. B.

ROPER (Richard). **An Account of some Anopheline Mosquitos found in British North Borneo, with Description of a New Species.**—*Bull. Entom. Research.* 1914. Sept. Vol. 5. No. 2. pp. 137–147. With 1 text fig. and 2 maps.

The observations were made during three years' estate medical work in British North Borneo. The climate, topography, etc. of the district in question are described. The spleen rates of the coolies on four estates and of the children in four villages were ascertained. It is noted that on one estate a coolie line, built on rising ground in the middle of an extensive swamp, was infested with malaria as long as there were large trees growing in the swamp, but became free as soon as the trees were felled. It is suggested that the large trees shielded the adult mosquitoes. It is a well-known fact, it is stated, that on a rubber estate so long as the trees remain small the malaria rate is small, but as the trees get large the malaria increases. There is a large amount of rice growing, but it is noted that cultivated rice fields do not seem to be a danger as regards malaria. In any jungle or swamp land on the borders of estates, where search was made, anopheline larvae were found, most commonly those of *A. kochi*. The data show that the spleen rate of an estate coolie force corresponds to some extent to the spleen rate of the neighbouring village, and the amount of malaria to the proximity of swamp breeding malaria-carrying mosquitoes.

Ten species of Anophelines were obtained, eight in the neighbourhood of one estate. *A. brevipalpis* is described as a new species; the wings are unspotted. *A. kochi* was by far the commonest anopheline found in the district. The finding of *A. maculatus* is noted as of importance to the rubber estates in Borneo in view of the work of STANTON and WATSON in the Federated Malay States on this species. *A. leucosphyrus* was constantly found biting coolies on one estate, malaria being common. In only one specimen could the stomach be dissected owing to the presence of blood. The author appears to think that this will prove to be a malaria carrier. *A. umbrosus* was very common; its larvae were frequently searched for, but were never found. Sporozoites of malaria were found in one specimen. The other species were *A. punctulatus*, *A. ludlowi*, *A. separatus*, *A. barbirostris*, and *A. albotaeniatus*. A. G. B.

FEDERATED MALAY STATES. **Report by the Travelling Medical Entomologist** (C. STRICKLAND) **for the Year 1913.** 4 pp. f'cap. Printed by F. M. S. Govt. Press. Received Dec. 18th, 1914.

The author writes that his chief concern has been with the biology of the mosquitoes concerned in the transmission of malaria. He does not give details in this report but notes that he has about 2,500 field observations recorded. The biological work has been interrupted by a "millions" experiment, details of which are supplied, and by the formation of a Malaria Bureau and Bureau of Medical Entomology. From 800 to 1,000 "millions" arrived from the West Indies on July 30th and were placed in a large tank in the experimental gardens at Kuala Lumpur. A few days later they were transferred to natural waters presenting diverse features, but at the same time answering as closely as possible to the characteristics of their natural West Indian habitats. Nevertheless, in all these places they seemed to dwindle or disappear. This being the case, it was determined that those which remained should be saved and nursed until they should become so plentiful that a balance of power on their side could be established. About 150 were recovered and put with a reserve originally placed in the plant-house tank. Later it was thought that the fish put in a certain lakelet were naturalising themselves. Other experimenters are advised to adopt the following system on the arrival of a consignment of fish:—

"1. Place them in a large tank made of rock or some material through which there is some drainage, and through which there is running water, but in which there are no other fish. It should also be partly in shade.

"2. When they are increased to a large number, an event which can be hastened by feeding them on egg, oatmeal, or chopped meat once a week, place them out in the natural waters in which it is hoped to establish them, but at first inside a pagar of fine wire.

"3. Finally the pagar can be removed."

It is now proposed that the author should make a complete survey of the distribution of Stegomyia in Malaya. A. G. B.

DIXON (Samuel G.). **The Duck as a Preventive against Malaria and Yellow Fever.**—*Jl. Amer. Med. Assoc.* 1914. Oct. 3. Vol. 63. No. 14. p. 1203.

The author states that the duck is one of the greatest known enemies of the mosquito and therefore of yellow fever and malaria. He built two dams near together on the same stream, each covering nearly 1,400 square feet. In one, twenty mallard ducks (*Anas platyrhynchos*) were permitted to feed, while the other was protected from waterfowl but well stocked with gold fish. The one in which the ducks fed was for several months quite free from mosquitoes, while the protected pond was swarming with young insects in different stages. To the infested pond ten well-fed mallard ducks were then admitted; at the end of 4 hours no pupae were to be found and in 48 hours only a few small larvae survived. For some years the author has used ducks to keep down mosquitoes in swamps that would have been very expensive to drain.

In the issue of the same journal for October 17th, Dr. W. C. HERMAN writes that he has observed the food of the wild duck for the last three years and finds that the mosquito and larvae are readily devoured by it. The best species for this purpose are the wood duck, *Aix sponsa*, which in nature is almost extinct, and the green-winged teal, *Nettion carolinensis*.

Commenting on this paper in the *Lancet*[*] of December 5th, 1914, Dr. A. BALFOUR refers to the writings of BEUTENMUELLER (1890), WEEKS (1890), and a Supplication "presented over a hundred years ago to the Sacred Tribunal in Rome by the Commune of Marsciano, Umbria, asking for a papal decree prohibiting the killing of nesting swallows for food because the destruction of these birds brought about the deterioration of the air, and hence insalubrity in the region."

A. G. B.

SEIDELIN (Harald) & SUMMERS-CONNAL (Sophia). **Notes upon the Biology of** *Stegomyia fasciata.*—*Yellow Fever Bureau Bull.* 1914. Sept. 30. Vol. 3. No. 3. pp. 187–192.

The authors refer to the explanation offered by MARCHOUX and SIMOND of the apparently contradictory observations that yellow fever is transmitted at night time only whereas the female *Stegomyia fasciata* bite at any time during day or night: namely that young females of *S. fasciata* when sucking blood for the first time bite indiscriminately day or night, but later on only during the hours of twilight and darkness. With the purpose of contributing to the study of this problem they isolated four females of *S. fasciata* in a cage and fed them for weeks at various hours on the arm of one of them. One or more males was always present. Full details are given. The experiment lasted from November 11th to January 18th, when the last mosquito was found dead. The experiment appeared to show that females of *S. fasciata* bite indiscriminately at day time and after dark. They anticipate and meet objections that the experimental conditions did not correspond with those in nature. They compare their experiment with that of

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[*] **Birds and Malaria,"** p. 1,326.

Marchoux and Simond, which they criticise. They write that they cannot believe that this theory is correct and suggest that the dogma of the non-transmission of yellow fever during the day may be wrong.

A. G. B.

Marzinowsky (E. I.). **De l'Existence de** *Stegomyia fasciata* (*St. calopus*) **en Russie.**—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 590–593.

The author, who took part in an expedition for the study of malaria sent to Batum, on the Black Sea, by the Pirogoff Society, found in that place a large number of *Stegomyia fasciata.* The same species was found later at Poti, to the north, by another member of the expedition. The author points out that Clarac and Simond in their monograph on yellow fever note the existence of *S. fasciata* in Spain, Portugal, Italy, Greece, and Crete. It is met with between 40° north and 40° south latitude. He notes that Batum is at 40° and Poti 42·2°. The distribution of these insects in the Mediterranean shows that they have been brought by steamboats to the Black Sea ports. At Batum in winter the thermometer goes down to 6·6°. He thinks it certain that the mosquitoes hibernate in the larval state and notes that Clarac found larvae in water that was scarcely 5°. He thinks that the existence of *S. fasciata* on the shore of the Black Sea is a permanent danger for Russia; yellow fever might at any time be imported by boats coming from South America. He has been informed that Dr. Gourko found *S. fasciata* at Tiflis, to which place it must have been imported from Batum by rail.

A. G. B.

Wheeler (William Morton). **Ants and Bees as Carriers of Pathogenic Micro-Organisms.**—*Amer. Jl. Trop. Dis, & Prevent. Med.* 1914. Sept. Vol. 2. No. 3. pp. 160–168.

In this paper, the author states, he gives expression to conjectures based on observation of certain insects which he believes will eventually occupy much more of the attention of sanitarians and entomologists in the tropics. He discusses the habits of the cockroach. Nearly all the species are thermophilous and are therefore confined to tropical or sub-tropical countries. Owing to their feeding habits and lurking places they must carry hosts of germs about, both in and on their bodies, and be able to infect food. The only evidence, however, is that collected by Longfellow, who found that one of the cockroaches of the United States could carry various micro-organisms on its legs and that the same could be cultivated from the faeces.

He mentions many species of ants which live near or in dwellings in the tropics. He states that *Monomorium destructor* is gravely suspected of being a disseminator of bubonic plague in India. The only other reference he has been able to find is to a paper by Darling. Darling found that when ants were immersed in broth culture of *B. typhosus* they were able for 24 hours to infect culture media over which they crept. He was unable to find typhoid bacilli or any other micro-organism in the intestinal tract and assumed that this was owing to the germicidal action of formic acid. The author points out that formic acid is not secreted in the alimentary canal of the ant and in any case is produced only by certain genera and species. He gives an interesting account of the ant's method of feeding :—

> "Ants live only on liquid food, either imbibed directly or sucked out of minute solid or semi-solid particles which have been rasped off by the tongue and pressed into a little pocket on the ventral side of the pharynx. The liquid thus expressed passes back through the oesophagus into the crop, or "social stomach," so called because it may thence be fed by regurgitation to other ants or to the larval brood. Later the little dry pellet is spit out of the subpharyngeal pocket. This pellet also contains the dirt scraped by the ant from its own legs and body by means of the tibial strigils, or combs, which are cleaned from time to time by being passed through the mouth. Hence the pellet may contain all kinds of micro-organisms and fungus spores collected from the outer surface of the body in addition to any that may have been contained in the solid food. As the ants may drop the pellets anywhere, even into the human food they are so fond of visiting, infection may result. . . . Under no circumstances would the micro-organisms necessarily come in contact with the formic acid of the ant's repugnatorial glands. It would seem to be possible, therefore, for ants to spread disease germs in three different ways: First, by simply walking over or into human food, as DARLING has shown; second, by dropping into it infected hypopharyngeal pellets, and third, by contaminating it with their germ-laden feces."

He gives an account of the habits of *Solenopsis geminata,* a small ant which is abundant in the tropics of both hemispheres. It stings so severely that in the West Indies it is commonly known as the "fire ant." It is a common tenant of the gardens in the patios of houses in Latin America. The author on one occasion found a number of nests of this species containing large numbers of full-grown fly larvae. He followed the ants and found that these larvae were extracted from masses of human excrement by the edge of the camp. As he says, the ants could hardly fail to transfer such organisms as *B. typhosus* or Entamoeba from faeces in which they might occur to any exposed food in the immediate vicinity.

He cites some habits of the stingless bees of the genus *Trigona.* These build in hollow tree trunks, or in the ground, nests of wax secreted by themselves and kneaded up with foreign substances; some species use moist earth, others the faeces of animals or man. Honey is stored in the cells and eagerly collected by man for food; it may very well be contaminated.

A. G. B.

BACOT (A. W.). **The Influence of Temperature, Submersion and Burial on the Survival of Eggs and Larvae of** *Cimex lectularius.*—*Bull. Entom. Research.* 1914. Sept. Vol. 5. Pt. 2. pp. 111–117.

These experiments were performed to determine whether it was possible that the eggs of the common bed-bug could survive the process of house destruction when the plaster from old walls, on which eggs had been laid, had been broken down and mixed with fresh mortar for making the partitions of rooms in new tenements. The methods are detailed.

The conclusions are as follows :--

"Eggs.—

"*Temperature.* Eggs of *Cimex lectularius* are able to survive exposure to temperatures between 40° and 50° F. for periods of 31 days, and between 28° and 32° F. for 48 hours. Periods of from 5 to 8 days at the latter temperature reduce the percentage hatching to 25 per cent. and longer exposures—10 to 15 days—are fatal. Temperatures between 60° F. to 98° F. are favourable, but 113° F. prevents hatching.

"*Burial in Sand.* Burial in dry or wet sand, with exposure to temperatures between 45° and 50° F. may be survived from four days to a week if the eggs are then uncovered and kept at a favourable temperature.

"*Submersion in Water.* Submergence in water at between 60° and 63° F. for a period of five days has no effect on hatching if the eggs are subsequently kept under favourable conditions. They also survive for at least three days in water at between 45° and 50°, and for 48 hours when the water in which they are submerged is frozen.

"*Lime-water.* Submergence in lime-water (saturated solution) for 46 hours is fatal. The eggs survive partial embedding in a wet plaster surface provided that emergence is not interfered with.

"Larvae.—

"Newly hatched bugs, when unfed, can survive a temperature of from 28° to 32° F. for periods up to 18 days. They are also able to withstand chilling, thawing, rechilling and again thawing over shorter periods. When subjected to cold, moist air after a full meal they are liable to a heavy or even total mortality—probably in consequence of humidity rather than cold.

"Under moderate conditions of temperature—60° to 65° F.—they may live for 136 days unfed, and after a meal, for nine months. Unfed, at a temperature of 75° F., with humidity between ·65 and ·70, an average life of 10 days, and an individual survival of up to 21 days is possible. At 88° F., with humidity between ·70 to ·80, the average life is shortened to 7 days—the longest survival being 11 days. At 96° F., with humidity at ·25 the average life is reduced to 5 days; individuals have survived for 8 days. Exposure to 113° F. is fatal within a few minutes."

A. G. B.

CORNWALL (J. W.) & PATTON (W. S.). **Some Observations on the Salivary Secretion of the Commoner Blood-Sucking Insects and Ticks.**—*Indian Jl. Med. Research,* 1914. Oct. Vol. 2. No. 2. pp. 569–593. With 2 charts.

The authors discuss previous speculations and investigations as to the exact means by which local irritation of the skin is produced by biting insects, quoting LEEUWENHOEK, REAUMER, NUTTALL and SHIPLEY, SCHAUDINN, and MACLOSKIE, and come to the conclusion that "in the case of the mosquito at least, some doubt still exists as to the exact function of the salivary secretion." The observations recorded in this paper were carried out to elucidate the following points:—

"(1) Whether the salivary glands of some of the commoner blood-sucking insects contain a substance which retards the coagulation of blood, and whether immunity against the anti-coagulin follows a long course of subjection to the bites of any particular insect, and whether such immunity can be produced by artificial means?

"(2) Whether this anticoagulin is the substance which causes the irritation following a bite; if not, to what is the irritation due?

"(3) Whether variations in the nature of the salivary secretion of different biting flies, considered together with their respective habits and the structure of their mouth parts, can throw any light on their position in a scheme of classification"

The experiments were carried out chiefly with *Philoematomyia insignis,* one of the commonest biting muscids in India, also with three blood-sucking species of Musca, two species of Stomoxys, a Tabanus, *Anopheles rossi* and *A. jamesi*, *Cimex rotundatus*, *Conorhinus rubrofaciatus* and *Argas persicus*. The conclusions, in part, are as follows :—

" 1. The salivary secretion of *Philamatomyia insignis* when first extracted from the glands is a colourless fluid, but after exposure to the air for about half an hour it turns black ; this reaction is due to oxidation which results in the formation of a pigment. The secretion contains a powerful anticoagulin ; emulsion of the salivary glands from one fly will delay the coagulation of 0·025 cc. of calf blood for 20′ while the emulsion from the salivary glands of from 3 to 5 flies will prevent coagulation of the same quantity of blood altogether. The formation of the pigment does not affect the anticoagulative property of the fluid. When allowed to dry for short periods the power of the anticoagulin is unimpaired, but if kept for long periods it loses its power. If absolute alcohol is allowed to act on the dried emulsion the anticoagulative power is unchanged. Glands soaked for a short time in ether, dilute acid and dilute alkali partially lose their anticoagulative power. The anticoagulin is insoluble in ether and therefore is not a lipoid. Heating the emulsion for 10′ to 100° C. does not destroy the anticoagulin.

" 2. The anticoagulin from the salivary glands of the male *insignis* is weaker than that from the female and it is less active in recently hatched flies of both sexes.

" 3. The mesenteron of *Ph. insignis* contains a powerful coagulin which is readily destroyed by heat ; the coagulin is most active in flies from 20 to 44 hours after their first feed of blood.

" 4 Inoculations of the salivary emulsion of *Ph. insignis* into a white rat does not result in the formation of an anti-body in its blood. Sera from the calf, rat and rabbit not so treated all contain some substance which inhibits the action of the anticoagulin ; that of the calf appears to be the least potent of all.

" 6. The salivary glands of *Tabanus albimedius* contain a powerful anticoagulin, so also those of *Anopheles rossii* and *A. jamesi* ; the secretion of the last two flies causes immediate agglutination of the red blood corpuscles. The emulsion of oesophageal diverticula of *A. jamesi* does not contain any anticoagulin.

" 10. Small quantities of the emulsion of the salivary glands of *A. jamesi* and *A. rossii* injected into the human skin cause small hyperaemic patches around the puncture and a wheal develops at its site ; no irritation is produced. The hyperaemic patches are probably due to the blocking of capillaries by the agglutinated red corpuscles. Small quantities of the emulsion of the oesophageal diverticula injected into the human skin produce a wheal and some hyperaemia but no bloody patches ; there was a slight irritation at the site of puncture in the case of one of the subjects. Sterile salt solution injected into the human skin produces a wheal and some hyperaemia.

" 11. The salivary secretion of *Philaematomyia insignis* does not produce any irritation when injected into the human skin ; some hyperaemia and a wheal develop at the site of the puncture.

" 12. The secretions from the ovoid salivary glands of the bed-bug and of *Conorhinus rubrofasciatus* probably cause the irritation following the bites of these insects.

A. G. B.

GORGAS (W. C.). **Recommendation as to Sanitation concerning Employees of the Mines on the Rand made to the Transvaal Chamber of Mines**—*Jl. Amer. Med. Assoc.* 1914. June 13. Vol. 62. No. 24. pp. 1855–1865.

Surgeon-General Gorgas visited Johannesburg in December, 1913, at the invitation of the Chamber of Mines, to investigate the cause of the high death rate from pneumonia among the native labourers working in the mines of the Rand. He found that during the year

1912 for about 300,000 natives employed in mines and industrial works in the proclaimed government district of the Transvaal, the death-rate was 26·84 per mille, of which 9·8 was due to pneumonia. Pneumonia was found to vary greatly according to the locality from which the natives came, being highest amongst those from Nyasaland and lowest in those from the Cape Province; 21,000 natives from tropical areas had a pneumonia death-rate of 26·3, and 199,000 natives from non-tropical areas a rate of 8. It is concluded that a community which has a large proportion of tropical natives will have a high pneumonia death-rate, and a community which has a large proportion of non-tropical natives a low pneumonia death-rate.

It is everywhere asserted at the mines that the new boy has a much higher rate of pneumonia than the old boy. MAYNARD found that the pneumonia rate was 15·83 per thousand during the first six months, 9·01 during the second six months and 5·31 during the third. The same is brought out well in a table of deaths according to month of service. Gorgas states that the uniformity with which pneumonia attacks the new boy or recently arrived native is as pronounced on the Rand and in Rhodesia as it was in the Isthmus of Panama, which indicates that the question of immunity is the most important element in the causation of the death-rate. In the construction of the Panama Canal there was much the same trouble with pneumonia among the negroes, the bulk of whom came from Jamaica and Barbados. A table shows the death-rate from 1906 to 1913.

TABLE 2.—DEATH-RATE AMONG NEGROES.

Year.	Death Rate.	Year.	Death Rate.
1906	18·74	1910	1·66
1907	10·61	1911	2·24
1908	2·60	1912	1·30
1909	1·66	1913*	0·42

A board was appointed to examine into the matter. There was found to be no particular relation to season nor to wet clothes; the men who slept in dry clothes had as much pneumonia as those who slept in wet. The difference in susceptibility was shown to be governed by the length of time that the labourer had been on the Isthmus. Pneumonia was found to be four and a half times as frequent among men who had been on the Isthmus less than three months as it was among men who had been on the Isthmus more than three months. The drop in the death-rate shown in the table is thus explained.

> "During the first few years on the Isthmus, we housed our negroes in barracks containing about eighty-four men each, and of such dimensions as to give them about 30 feet of floor-space. This is ordinarily considered very crowded. In 1907 we allowed our negro labourers to scatter out along the line of the Canal, build each man his hut, with a small cultivable piece of land, and bring over his family. In 1910 our negro force was 37,000. Of this force, only about 7,000 lived in barracks; the other 30,000 lived in their own establishments. To this fact of scattering I attribute the disappearance of epidemic pneumonia."

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* First eight months.

It is noted that among the 24,000 negroes coming to the Isthmus in 1905 there was a very small proportion of persons who had been there before, whereas among the 21,000 coming in 1912 there was a very large proportion; this has also to be considered.

Gorgas advises that the question of immunisation for pneumonia as recommended by WRIGHT should be carefully looked into. As tried on the Rand the inoculated did not show any greater protection than the controls, but as used in the Premier Mine in 1913 the results seem very striking.

> "In 1912, the 17,000 inoculated had a death-rate from pneumonia of 6·89 per thousand, and the 6,700 controls a death-rate of 17·72 per thousand. The inoculated and controls were selected at random, and I can see no reasonable explanation for the marked difference between the pneumonia death-rate of the inoculated and that of the controls, except that the inoculation gave a large degree of protection to the inoculated."

Darling has suggested that the vaccine used at the Premier mine was made from a different strain than that used on the Rand.

With regard to the housing of the natives, Gorgas remarks that the quarters are much too crowded; each man has in general 200 cubic feet of air space, which would give him 14 feet of floor space. The occupants are thus forced into close personal contact. He is also struck by the character of the rations; the two chief components are 21 pounds of mealie meal and $5\frac{85}{100}$ ounces of meat per diem. This he thinks is a great deal too large a proportion of carbohydrate for men doing hard manual labour. On the Isthmus there was at first a good deal of trouble as to rations. "The whole matter of food was satisfactorily settled both for the negro and ourselves when the families came and when we established commissaries for the sale of food at cost. The negro then bought what he liked in such quantities as he wished and his wife cooked it in the manner in which they had been accustomed."

A. G. B.

ROWLAND (E. D.). **Pneumonia in British Guiana.**—*Brit. Guiana Med. Ann. for 1913.* pp. 38–74. With 20 tables and 3 charts. 1914. Letchworth: Garden City Press, Ltd.

Pneumonia is responsible for a large number and a high percentage of deaths in British Guiana, especially among able-bodied labourers during their most productive age. Apart from more accurate diagnosis the author inclines to the belief that there has been a true increase in the number of cases. A table shows that in 30 years the deaths have risen from 240, or 2·8 per cent. of the total mortality, to 727 or 8·3 per cent. In twenty years the population has increased from 252,000 to 296,000 (males, 153,700; females, 142,300), but while the total number of deaths has only slightly increased the number of deaths from pneumonia has more than doubled. Reference is made to the previous history of the disease in the Colony and the writings of GRIEVE, LAW, FERGUSON, DANIELS and WISE are quoted. In 1896 DANIELS drew attention to the high rate of this disease amongst the East Indians. The author states that it is extremely rare in the prisons and seldom seen in the lunatic asylum.

Another table shows that the disease is widely distributed throughout the Colony and is possibly even more prevalent in the country than in the towns. Sixty per cent. of all cases are East Indians and the greater number males. Table 4 (reproduced) shows the cases of pneumonia treated in the Public Hospital at Georgetown for four years.

TABLE IV.—Return of Cases of Pneumonia treated in the Public Hospital, Georgetown, for the years 1910, 1911, 1912, and 1913, showing the sexes of the persons treated, their residence before admission and those who died.

Race.	Cases.			Residence.				Died.		
				Town.		Country.				
	M.	F.	Tot.	M.	F.	M.	F.	M.	F.	Tot.
Europeans ..	9	2	11	7	1	2	1	2	1	3
Portuguese ..	28	9	37	17	6	11	3	13	6	19
East Indians	571	90	661	129	24	442	66	254	44	298
Chinese ..	5	..	5	1	..	4	..	4	..	4
Aborigines ..	16	5	21	1	..	15	5	11	3	14
Blacks ..	342	129	471	173	82	169	47	103	52	155
Mixed ..	47	12	59	39	10	8	2	15	5	20
Total ..	1018	247	1265	367	123	651	124	402	111	513

The table brings out the higher rate among the men as well as the fact that the greater number came from the country, 59·6 per cent. as against 40·4 from the town; in England pneumonia is a disease of town life. Figures are given which show that an abrupt increase in the pneumonia rate synchronised with the arrival of influenza in 1890. Since 1910 there has been a fall in the number of deaths. Charts show that the disease does not prevail at any definite season nor during any special month, and that it is related neither to the monthly nor annual rainfall.

The case mortality in the London hospitals for a period of ten years is given as 21·8 per cent.; in the public hospitals in British Guiana the rate before 1906 was 59 per cent. and more; in 1912 it was as low as 40 per cent. In the Estates' Hospitals the case mortality is lower—30 to 40 per cent. Another table furnishes the reason for the high death-rate at the Public Hospital at Georgetown: 50 per cent. of the cases died in less than 72 hours; that is to say, they are brought too late for any beneficial treatment and probably many are killed by the journey.

As table 4 shows, the cases chiefly occurred amongst the East Indians and the blacks; they form 80 per cent. of the population and their pneumonia rate is as high as 90. Fifty-one per cent. of the East Indians are Creoles, but the pneumonia rate is 19·8 per cent. Creoles and 81 per cent. natives of India.

"All these figures show that the East Indians, natives of India, suffer most of all our races, and the males are specially victims. These are our most ignorant people, living on the poorest food and dwelling in the worst houses, and are perhaps our hardest and most industrious labourers. The peculiar predilection of the males to this disease is curiously exemplified in this race. Here the men and women live under the same conditions, occupy similar rooms, do more or less similar field work, the women being exempt from the harder labour of shovel and fork only, suffer the same anchylostome infection, and yet there is this great disproportion in the incidence of the disease."

"'All races who can live in decent houses with no crowding in the sleeping rooms and little or no privation do not suffer from this disease; but all persons, of no matter which race, who live in small, ill-ventilated houses and crowded bedrooms, and who have barely a living wage as a result of their hard labour and a minimum of food, suffer and suffer badly.'

In England pneumonia affects men to a higher extent than women, which is attributed to the greater alcoholic habits of the males. This is not an adequate explanation in British Guiana for the East Indian is a teetotaler; ankylostomiasis is probably a more important factor. [Is this more common in men ?]

With respect to age distribution, of the 1,265 cases 55 per cent. were between 20 and 40; the disease was rare in children under one year.

Under the heading Treatment, the author emphasises the fact that the disease is due to the pernicious habit of sleeping in ill-ventilated rooms. "A man does not develop pneumonia because he is trained up in the fields, but he does develop the disease by sleeping in the foul germ-laden atmosphere of an ill-ventilated room." "An adult requires 3,000 cubic feet of fresh new air every hour; when everyone has this pneumonia will disappear from our mortality." He goes on to say that better housing is required throughout the whole Colony. Even the rooms in the coolie ranges leave much to be desired. "The enormous drop in the death-rate from 60 and 70 per cent. in the case mortality prior to 1906 at the Public Hospital, Georgetown, to 45 per cent. in the following years was brought about in great part by changing the patients to better ventilated wards, where they were given over 100 square feet of floor space and . . . . ample ventilation."

Many instructive tables are appended to the paper.

[This paper and that of GORGAS are specially useful to those who are responsible for the health of large bodies of labourers in the tropics. Information as to the diet of the East Indian labourers in British Guiana would be of value, as well as details of their housing. Perhaps these are to be found in the Surgeon-General's Reports. It would also be of interest to know whether the incidence is specially on newly arrived labourers as in the Isthmus of Panama.]

A. G. B.

BOOK REVIEW.

NOELLER (Wilhelm). **Die Uebertragungsweise der Rattentrypanosomen. Ein experimenteller und kritischer Beitrag zur Kenntnis des Uebertragungsproblems der Trypanosomen überhaupt mit besonderer Berücksichtigung der parasitischen Protozoen einiger Haustierflöhe.** —83 pp. With 8 text-figs. and 2 plates. Reprinted from *Archiv für Protistenkunde.* Vols. 25 and 34. 1914. Jena: Gustav Fischer. (Price 3 Mk.).

This work is a reprint in pamphlet-form of the two papers published by the author in the *Archiv für Protistenkunde,* Band xxv (1912), p. 386 and Band xxxiv (1914), p. 295. The first of these papers was reviewed in the *Sleeping Sickness Bulletin,* Vol. iv, p. 215; the second in the *Tropical Diseases Bulletin,* Vol. iv, p. 269. In this review it is proposed, first, to discuss the results obtained by Nöller in their general bearing, theoretical and practical; secondly, to criticize some details of Nöller's work in the light of recent experience.

The outstanding discovery made by Nöller is the clear and convincing demonstration, confirmed by WENYON* and others, that *Trypanosoma lewisi* passes from the flea to the rat in the faeces of the flea, by the faeces being deposited on the skin of the rat and licked off, while still moist, by the rat. If the faeces of the flea contain the small stumpy trypanosomes which are the final form of the development of *T. lewisi* in the flea, the rat becomes infected. The small trypanosomes cannot, however, withstand desiccation and, if the faeces are dried before being licked off, no infection takes place.

In these results we have, therefore, for the first time the definite proof that a trypanosome can be transmitted from its invertebrate to its vertebrate host by the " contaminative " method, and it is no longer necessary to suppose that the transmission from invertebrate to vertebrate must be in all cases of the " inoculative " type, that is to say, that the parasite must pass into the vertebrate through the proboscis of the invertebrate during the act of blood-sucking.† It should be noted further in this connection that the numerous experiments undertaken by many investigators in order to prove transmission of *T. lewisi* by the proboscis of the flea in the act of blood-sucking have all, without exception, given negative results, and it seems certain that inoculative transmission does not take place in this instance.

**Jl. London School Trop. Med.*, ii, pp. 119–123.

†The reviewer suggested the possibility of a contaminative transmission of this kind in 1907 (*Proc. Roy. Soc.* B, lxxix, p. 39), when describing the cysts of " *Trypanosoma grayi* " but was told in conversation by one of the leading authorities upon tropical medicine in this country that his notions were " far-fetched " and unpractical. Nöller's results show the necessity for maintaining a more open mind upon such questions. With regard to the problematic and extremely polymorphic flagellates found in *Glossina palpalis* and generally lumped together under the designation " *Trypanosoma grayi* Novy," it seems very probable that this name covers, in reality, the developmental stages of several distinct species of *Trypanosomidae.* The investigations of KLEINE (*Deutsch. med. Woch.*, Vol. xxxvi, pp. 1,400–1,403) and KLEINE and TAUTE (*Arbeiten k. Gesundheitsamt,* xxxi, pp. 350–353) show that " *T. grayi* " includes the developmental stages of the trypanosome of the crocodile; while the fact that " *T. grayi* " was found swarming in a tsetse which had been bred from a pupa and fed on the blood of a fowl (*Proc. Roy. Soc.* B, lxxviii, p. 252), indicates that the name covers also developmental stages of bird-trypanosomes transmitted by the fly. On the other hand, ROUBAUD's investigations indicate that a flagellate parasite of the fly, " *Cystotrypanosoma grayi,*" is also included under the specific name (*C. R. Soc. Biol.* lxxii, p. 440). There is no reason why an omnivorous blood-sucker like the tsetse-fly should not transmit several species of trypanosomes of wild animals, since it is well known that a given species of fly, *G. palpalis,* for example, can transmit more than one species of pathogenic trypanosome.]

The discovery of contaminative transmission of trypanosomes by the invertebrate host is very interesting, in the first place, from the theoretical and phylogenetic stand-point. According to the view put forward first by LÉGER, supported by BRUMPT, and now generally held to be true, the *Trypanosomidae** are a group of flagellates parasitic primarily in the digestive tracts of invertebrate hosts. The primitive type is seen in the genera *Leptomonas, Herpetomonas* and *Crithidia,* which have a monogenetic life-cycle (without alternation of hosts) and are transmitted from host to host by the contaminative method, in the form of resistant, encysted, non-flagellated (leishmanial) forms, the so-called post-flagellate† phase of PATTON. The next advance upon this ancestral type was brought about when some of the invertebrate hosts took to a blood-sucking habit, whereby the flagellate parasites in their digestive tracts became habituated to life in vertebrate blood as a nutritive medium. The final step was accomplished when certain of these flagellate parasites succeeded in passing in some way (perhaps in different ways in different cases) from the blood-sucking invertebrate into the vertebrate, and thus establishing themselves as parasites of the blood or tissues of the latter. Thus arose, in all probability, the species of the genera *Trypanosoma* and *Leishmania* (*sensu strictiori*), digenetic parasites with an alternation of hosts, vertebrate and invertebrate.‡ Present knowledge indicates, so far as it goes, that the species of *Trypanosoma* arose ancestrally from species of *Crithidia,* and those of *Leishmania* similarly from species of *Leptomonas* ; since trypanosomes exhibit crithidial forms, and leishmanias leptomonad forms, in their development in the invertebrate host ; a peculiarity easily explained as a reversion to an ancestral type of form and structure under ancestral conditions of life and environment.

If now the theory of LÉGER and BRUMPT be correct, it follows that the primitive method of transmission from host to host in the *Trypanosomidae* generally was the contaminative method, that is to say, through the faeces of the invertebrate. In this way they must have passed originally from invertebrate to invertebrate, and in this way they may well have obtained a footing in the vertebrate host, and have been transmitted from invertebrate to vertebrate, in the first instance. It is therefore of extreme interest to find that in *T. lewisi* the infection still passes from the flea to rat by the primitive contaminative method.§ There is, indeed, one important difference between the mode of transmission of *T. lewisi* and that of the monogenetic insect-flagellates. In the latter the propagative phases, as already mentioned, are resistant, encysted leishmanial forms, but in *T. lewisi* the final, infective phase of the development in the flea is a little stumpy trypanosome-form which cannot withstand desiccation. In all other species of trypanosomes, of which the development in the invertebrate host has been fully studied, the final form of that development is also a trypanosome-form. But the data are as yet inadequate to support the general statement that the form in which trypanosomes are transmitted from the invertebrate to the vertebrate host is always a trypanosome-form; should this prove, however, to be a universal peculiarity of trypanosome-development, it is best interpreted as a secondary developmental adaptation or modification, whereby the primitive encysted leishmanial form has been replaced by a precociously-developed trypanosome-form as the final infective stage of the cycle in the invertebrate. Nothing is known as yet with regard to the form in which the species of *Leishmania* pass from the invertebrate to the vertebrate host; but it is worthy of note that according to PATTON* the final stage of the development of *Leishmania donovani* in *Cimex* spp. is an encapsuled leishmanial form, which he considers to be homologous with the "post-flagellate" phase of monogenetic leptomonads, although he does not appear to have considered the possibility that this form might serve for contaminative transmission, as in the true species of *Leptomonas*.

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*By the term *Trypanosomidae* is to be understood the section of the Haemoflagellates characterized by the possession of a single flagellum. The biflagellate genera *Trypanoplasma* and *Prowazekia* constitute quite a distinct group, to which the phylogenetic speculations of LÉGER and BRUMPT probably do not apply.

†The term " post-flagellate " lays emphasis upon a point which is immaterial namely the absence of a flagellum ; the point which is of main importance for the contaminative transmission is that the non-flagellated leishmanial form is encysted and thereby able to resist desiccation as shown by WENYON in the case of *Leptomonas pattoni* of the flea (*Trans. Trop. Med. Hyg.* vii, pp. 103, 104). The ordinary trophic leishmanial form, that is say the form which grows and multiplies and is actively parasitic, cannot resist desiccation, as WENYON has also shown.

‡It has been proposed to abolish the genus *Leishmania* and to include all the species under *Leptomonas* (*Herpetomonas*). But as WENYON has pointed out (*Parasitology* iii, p. 69, footnote,) it is convenient, to say the least, to retain the generic name *Leishmania* for the digenetic species, with alternation of vertebrate and invertebrate hosts, and *Leptomonas* for the monogenetic species parasitic solely in invertebrate hosts. This does not preclude our recognizing leishmanial forms in the development of *Leptomonas,* or leptomonad forms in the development of *Leishmania.*

§The experiments of BRUMPT, cited by Nöller, indicate that the Brazilian human trypanosome (*T. cruzi*) can also be transmitted through the faeces of the invertebrate host, the bug *Conorhinus* (vel *Triatoma*) ; but, as Nöller has pointed out, BRUMPT obtained his infections by intra-peritoneal inoculations of the faeces of the bug, and not *per os.*

It must be pointed out, finally, in discussing the problem of transmission, that the contaminative method, as seen in *T. lewisi*, is a very casual method which often fails to infect, even when the flea is known to be infective.† On the other hand, infection by the inoculative method is a practical certainty when the infective forms of the parasite are present in the salivary glands of the proboscis of the invertebrate blood-sucking host, and there can be no doubt that inoculation is a far more efficient method of transmission than contamination. In considering the relationship of these two methods, it may be that the contaminative method was the more primitive in all cases, and that it has become replaced secondarily, in most cases, by the much surer inoculative method; it may be, on the other hand, that in many cases the primitive monogenetic parasite succeeded in establishing itself in the salivary glands of the invertebrate host, and from thence succeeded in obtaining a footing in the vertebrate by direct inoculation. There is not at present enough concrete evidence to make the one or the other of these two possibilities the more probable.

From the purely practical point of view the discovery of Nöller leads to some important considerations. Apart from the fact that it indicates methods of dissemination, which have not as yet been reckoned with sufficiently in the investigation of blood-parasites, another possibility must be pointed out which is well worth bearing in mind by those engaged in the study of the modes of infection; namely, that if the parasite can pass from the invertebrate to the vertebrate host by faecal contamination, it is not necessary that the invertebrate host should be a blood-sucking insect in all cases. If, for instance, the parasite could pass out of the vertebrate host also in the faeces, in some form in which it could be taken up by some larval or adult invertebrate which feeds on the faeces (such as, for example, a house-fly), it might then be returned to the vertebrate again by the contaminative method.‡

A few points in Nöller's memoir call for short notice and criticism. The first of these relates to the question of direct or mechanical infection with *T. lewisi* by means of the flea. Nöller does not appear to have investigated the problem himself, and his statements with regard to the work of others are not accurate. He states on p. 9 (=388**) that "Swellengrebel and Strickland . . . furnished

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**Scientific Memoirs by Officers of the Medical & Sanitary Departments of the Government of India,* No. 53, 1912.

†Compare MINCHIN and THOMSON, *Quart. Journ. Micr. Sci.* lx, part 4 (Jan. 1915), pp. 640 & 662.

‡See MACKIE (*Indian Jl. of Med. Research*, ii, pp. 510–515) on the possibility of the infection of kala azar passing out of the human body in the faeces. Mackie raises the possibility of direct contamination from man to man but does not seem to have considered the possibility of the intervention of some dung-feeding insect.

**The pagination given in brackets is that of the original publication in the *Archiv für Protistenkunde*.

the proof that a mechanical infection can occur when the fleas are interrupted during sucking on an infected rat and thereupon continue the act of suction immediately on a clean rat (*unmittelbar darauf den Saugakt auf einer gesunden Ratte fortsetzen*). The only references to mechanical transmission which the reviewer has been able to find in the works of the authors named are the following:—

(i) Strickland and Swellengrebel, *Parasitology* iii, p. 442: "*Experiment* 10.—Fleas were used which had been raised in the laboratory, in the manner advised by the Indian Plague Commission, in large boxes in which a flea-infested rat had been placed. Under such conditions the fleas readily multiply in the filth which soon collects in the box. Eleven of such fleas were fed for one hour on a rat whose blood had showed *T. lewisi* for 12 weeks. After 24 and 72 hours the fleas were again fed on a "clean" rat D. Rat D became infected in 7 days. After this the fleas were fed at intervals on a series of "clean" animals, but they did not infect the rats again till the 34th day."

(ii) Ibid. p. 444. "The following experiment seems to indicate that 'mechanical' transmission is effected by the bite: *Experiment* 18.—Ten fleas from an infected rat were fed within 24 hours on a clean rat *through gauze*, with resultant infection. After this the fleas were similarly fed on a series of animals with negative results for about four weeks. They were then put on another rat and left on it and this became infected."

It is clear that neither of these experiments conform to Nöller's description of interrupted feeding, since in both experiments the fleas were transferred from one rat to the other with intervals of 24 hours, and *not* "unmittelbar darauf." It should be added that neither of the experiments of Strickland and Swellengrebel are in the least convincing as a proof of mechanical transmission. The most likely interpretation of Exp. 10 is that amongst the fleas on "the flea-infested rat" were some that were already infected with *T. lewisi*. It is not stated whether the flea-infested rat was a wild rat, but if so it might well have had an infection of *T. lewisi* and recovered from it, in which case it would show no trypanosomes in its blood and would be immune to a fresh infection from any infected fleas on it. The most probable explanation of the result obtained in Exp. 18 is either that the supposed clean rat had already acquired an infection elsewhere, or that some, or at least one, of the fleas used escaped on to it.

Various data have now accumulated which render a mechanical transmission of *T. lewisi* by the flea highly improbable and in need of very rigorous and convincing proof before it can be accepted as really taking place under either natural or artificial conditions. Noller states on p. 20 (-399) and p. 24 (=403) that the dog-flea feeds eagerly ("*mit Behagen*") for several hours uninterruptedly on the same spot of the rat's skin and defaecates frequently during this time,* passing faeces from 7–15 times during the act of suction. If the flea be fed on a well-infected rat, many actively-moving trypanosomes are found in the first drops of faeces passed half an hour after the flea begins to suck. On pp. 40 and 41 (=419 and 420) it is shown that these trypanosomes, which have passed straight through the flea, do not produce infection of the rat when placed on its tongue, although infection is produced readily in this way when the final forms of the development in the flea, the little stumpy trypanosomes, have appeared five days later in the faeces of the flea. Minchin and Thomson showed that *T. lewisi*, after being 35 minutes in the flea's stomach, failed to infect clean rats when injected into them.† From those observations it is clear that *T. lewisi* is altered in its physiological properties, in such a manner that it can no longer infect rats, so soon after it passes into the flea's body that the possibility of a mechanical infection becomes extremely slight. To this should be added further that Minchin and Thomson were never able to observe trypanosomes in the proboscis of the flea, nor to produce infections by inoculation of proboscides into rats.

Nöller discusses (p. 18 =397) the precautions (*Vorsichtsmassregeln*) taken by others in their experiments on transmission (*Uebertragungsversuche*), especially that of using only bred-out insects in the experiments in order to avoid making use of insects which, if caught wild, might be already infected with the parasites which are the subject of the investigation. He remarks that the use of bred-out fleas only guards against their being infected with trypanosomes of vertebrates, and is no guarantee against infection with the specific parasites of the flea, since the larvae of the fleas can be infected with flagellate parasites, and thus even bred-out fleas may have an infection with them. He states that he was able to dispense with the use of bred-out fleas, since his method of tethering

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*These statements do not apply at all to the rat-flea *Ceratophyllus fasciatus*, which sucks only for a relatively very short time, not more than 2½ minutes, and does not defaecate while feeding; compare Strickland and Swellengrebel (*l.c.*, p. 444) and Minchin and Thomson (*l.c.*, p. 653).

†*l.c.*, p. 634.

fleas made it possible for him to examine during life every flea that he used so exactly (*genau*), that he could detect an infection with Flagellates with certainty (*eine Infektion mit Flagellaten mit Sicherheit feststellen kann*).

There is a strange confusion of ideas here. The presence of specific flagellate parasites in the insects is without any bearing on the validity of positive transmission-experiments. If an experiment with fleas or other insects proves that they transmit *T. lewisi* or any other parasite of vertebrates, the conclusion drawn from the experiment is quite unaffected by the presence in the flea of parasites specifically distinct from the parasite of the vertebrate in question. If the specific parasites of the insects could have any effect on such transmission-experiments, it could only be in producing negative results, for example, if the parasite of the vertebrate were unable to develop in the gut of an insect already fully occupied by its own specific parasite. And it may be added further that those who know from experience how easily a scanty infection with flagellates may be overlooked in a flea, even after dissection and careful microscopic examination, will be inclined to be sceptical with regard to Nöller's claim to be able to detect such infections in the living flea.

On the other hand specific infections of the insect-host may be a source of confusion and error to those studying the morphology and sequence of the various types composing the developmental cycle of a parasite in the insect-host. It is remarkable that Nöller seems to have fallen himself into just the trap against which he warns others, and not to have distinguished clearly between the stages of *T. lewisi* in the flea and those of the *Leptomonas* sp. which, as he acknowledges, occurred frequently in the fleas used by him in his experiments. On the other hand MINCHIN and THOMSON* claim to have avoided any such confusion, since they worked with two distinct strains of bred fleas, the one entirely free from any *Leptomonas*-infection, the other heavily infected with *Leptomonas pattoni*; consequently, in the one strain they were able to study the development of *T. lewisi*, quite free from admixture of stages of leptomonads, while in the other they were able similarly to study, for comparison, the forms of a pure infection of *L. pattoni*. Now comparing the two accounts, certain discrepancies are at once apparent. Nöller writes (p. 40 = 419) "A distinction between the rat-trypanosomes in the dog-flea and the *Leptomonas* is extraordinarily easy, since in the trypanosomes forms with typical undulating membrane are almost always (*fast stets*) present in addition to the stages of the multiple division, while the *Leptomonas*-clumps consist throughout of oval forms in which I have not yet found an undulating membrane." But the typical haptomonad phase of *T. lewisi* is also a rounded or oval form without any trace of an undulating membrane, often without a free flagellum, and is quite indistinguishable from the corresponding stage of *L. pattoni* (compare MINCHIN and THOMSON, l.c., pl. 41, figs. 166–168, and pl. 42, figs. 220–230, 241–252, 277, etc., *T. lewisi*, with pl. 42, figs. 278, 279, *L. pattoni*); and Nöller's figure of "*Leptomonas* spec." (Fig. 1, p. 16 = 395) might represent the haptomonad phase of either *T. lewisi* or of a *Leptomonas*. The two parasites are only clearly distinguishable in the nectomonad phase, which represents as it were the typical, adult, specific form of the parasites in each case (compare MINCHIN and THOMSON, l.c., pl. 41, fig. 196, pl. 42, figs. 254, etc., *T. lewisi*, with pl. 42, figs. 285, 286, *L. pattoni*). In the nectomonad phase *T. lewisi* shows a rudiment of an undulating membrane, not very distinct, of which there is no trace in *L. pattoni*, and the form and structure of the body differs markedly in the two cases. Nöller does not appear to have seen the nectomonads of his *Leptomonas*. Again Nöller states that the fixed trypanosomes multiply actively by binary fission and multiple division; MINCHIN and THOMSON found multiple division in *Leptomonas pattoni* but never in the crithidial phase of *T. lewisi*, in which the multiplication was found to be invariably by means of binary fission. These discrepancies in the two accounts can only be explained either by supposing that Nöller did not distinguish clearly between the stages of *Leptomonas* and the crithidial stages of *T. lewisi*, or on the very improbable supposition that the development of *T. lewisi* in the dog-flea differs from that which it goes through in the rat-flea.

On p. 26 (=405) Nöller states that in a flea four days after the first infective feed he found the intestines lined by a continuous layer of flagellates of "pronounced trypanosome-form," the "blepharoplast" close to the hinder end or near the nucleus, the undulating membrane strongly developed. This description does not recall in the least the proctodeal phase of *T. lewisi*, which is a typical crithidial form, but suggests rather the forms of the degenerative series, of which Nöller makes no mention.

Nöller explains the mechanism of the dissemination of the trypanosome from the flea (p. 60=313, part II) by supposing that the trypanosomes must multiply in the intestine (*Dünndarm*) to such an extent that they present an obstacle to the passage of the faeces, till finally masses of trypanosomes are torn loose by the faeces and so pass out from the rat. But in the rat-flea, at least, the trypanosomes develop usually in the rectum and are rarely found in the intestine, except in its pyloric region, and infection may be produced by fleas which possess themselves an extraordinarily scanty infection in the proctodaeum. There can be no doubt that the final infective trypanosome-form becomes loose from its attachment from the wall of the proctodaeum and passes out of the flea without necessarily any pressure exerted by the faeces to dislodge it.

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*l.c., p. 479.

At the conclusion of his work Nöller gives a classification of trypanosomes based on their method of transmission. He recognizes three main groups of trypanosomes, with subdivisions, as follows:—

1. Trypanosomes transmitted by leeches
    - (*a*) The group of *T. inopinatum*, a true parasite of the leech, *Helobdella*, in which it can be transmitted from parent to offspring.
    - (*b*) Trypanosomes not transmitted from parent to offspring in the leech.
        - (i) Trypanosomes of marine fishes and of tortoises: first divisions in the leech takes place in leishmanial forms.
        - (ii) Trypanosomes of freshwater fishes, probably also of Amphibia: first divisions in the leech take place in flagellated forms.
2. Trypanosomes transmitted by Arthropods
    - (*a*) Trypanosomes transmitted by fleas: *lewisi*-group, etc.
    - (*b*) Trypanosomes transmitted by bugs: *Schizotrypanum cruzi.*
    - (*c*) Trypanosomes transmitted by Diptera: the African pathogenic group, with further subdivisions.
    - (*d*) Trypanosomes transmitted mechanically by Diptera: *T. equinum* and *T. evansi.*
3. Trypanosomes that do not require an invertebrate carrier: *T. equiperdum.*

A classification of trypanosomes, based on a similar principle, but taking into consideration the vertebrate as well as the invertebrate host, and therefore differing in some particulars from Nöller's scheme, was put forward by the present writer in his lectures at the Lister Institute in 1913; he hopes to publish it before long and therefore reserves his detailed criticism of Nöller's classification for the present, merely stating his conviction that a natural classification of these flagellates must be based on their life-cycles and development. At the same time it should be pointed out that although the zoologist seeks only natural classifications, that is to say, classifications based on the genetic affinities of the organisms dealt with, an artificial but strictly logical classification may possibly serve better the requirements of those who approach the study of trypanosomes with other than zoological aims.

E. A. Minchin.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. 5.] 1915. [No. 6.

LEPROSY.

Blanquier (H.). La Lèpre dans le Cercle de Touba (Côte d'Ivoire).—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 559–564.

In this district leprosy is at once extremely widespread and extremely irregular in its distribution. For example, one village of 227 inhabitants had 48 lepers and another of 266 had 36, while a third of 807 had only 5 and a fourth of 235 had only 2. It would appear that the percentage incidence is a rough measure of the duration of infection, and that the disease, once it attacks a village, tends to invade the whole population, progressing the more rapidly the wider its spread. One may find, e.g., the head of a house leprous, and also his first wife, her two sons and three daughters, his second wife and her son and daughter, as well as his two brothers all lepers—a family focus of infection which disseminates the disease as the daughters marry. It is less common in the north than in the south, and was apparently introduced from the north. The open sores, so common elsewhere, are rare here, and contagion appears to be from mother to infant (either *in utero* or in early childhood) or through parasites (scabies), but tatoo scars were often seen in the centre of leprous lesions, and conjugal transmission and nasal contamination are possible. The writer considers segregation and immediate separation of the child at birth from the leprous mother to be the only method of control possible in this region. He gives a rough table, based on a large number of cases, of the lowest age at which he found the lesions to occur, and it would be valuable to have the experience of others on this point. It is as follows:—

Before 2 years old: Swelling of face, conjunctivitis, nasal discharge. At 2 years old: Change in skin colour, pale patches, chiefly on face, with smooth surface. At 6, patches with a raised, often reddened margin, and more or less confluent. At 10, simple scars, more or less radiating, not cheloid. At 15, tubercles, from simple swelling to an appearance almost of elephantiasis. At 20, colourless patches. At 25, cheloid scars, with tense bands. At 35, skin shiny and dry-looking. At 40, deformations. At 45, mutilations.

J. Henderson Smith.

(C152) Wt. P11/3. 2,000. 5.15. B.&F.Ltd Gp.11/4.

Dalziel (L. M.). **The Relation of Fish to Leprosy in Northern Nigeria.** (Correspondence).—*Lancet.* 1914. Aug. 22. p. 525.

Balfour (Andrew). **The Relation of Fish to Leprosy.** (Correspondence). —*Ibid.* Sept. 12. p. 718.

Dalziel has already published an account (extracted in *Jl. Trop. Med. & Hyg.*, 1912, p. 70) of leprosy in Sokoto, in which he estimates the incidence of the disease in this province to be as high as 52 per 10,000. The native view is not that *dried* fish as such is the cause of the disease, but certain kinds of fish are suspected, even when fresh. All native opinions of this kind must be received with scepticism; e.g., the white spots and stripes of the bush-buck suggest to the native the leucodermatous patches of leprosy and he infers a connection between them, and it is possible that the smooth, slimy and often maculated skin of the catfish has given rise to the current belief. But it is worth noting that "while all beliefs incriminate a variety of foodstuffs, fish of one or a few defined species are common to all," and in most of the cases definitely observed the species belonged to the family of catfish (*Siluridae*).

Balfour draws attention to Anderson's report (1908), in which mudfish, prepared by opening and drying in slices in the sun or smoke, were stated to be popularly associated in South Kordofan with leprosy. This fish Balfour found to belong to the genus *Clarias* of the *Siluridae*.

J. H. S.

De Beurmann & Anglada (Mlle.). **Lèpre Conjugale. Contamination probable du Mari par la Femme, Présentation de Malades.**—*Bull. et Mém. Soc. Méd. de Paris*, 1914. Nov. 19. 3e Ser. Vol. 30. Nos. 31–32–33. pp. 349–357.

The first symptoms appeared in the wife in 1909 and in spite of treatment the disease continued to develop as a progressive and exclusively tubercular leprosy. In 1911 the first sign appeared in the husband, a macule, and there is little doubt that he suffers from the nervous type of the disease. Both patients come from the Argentine, where the wife's symptoms appeared, and one cannot exclude the possibility that both were infected there independently. The authors, who are convinced of the contagiousness of leprosy, discuss the explanations which have been offered of the apparently much greater communicability in countries where it is common than in countries such as France, and deprecate as alarming and unnecessary the adoption of any rigorous measures of isolation and notification in the latter.

J. H. S.

Lama (A.). **Contributo alla Epidemiologia della Lebbra.**—*Giorn. Ital. Mal. Ven.* 1914. Vol. 49. pp. 465–472.

The writer suggests that leprosy is frequently carried by the Chigger (*Sarcopsylla penetrans*). In 12 cases he elicited a history of apparent infection by this insect 12 to 14 years before the appearance of leprosy symptoms, and he supports the idea by pointing out that the early lesions in leprosy appear most frequently in the uncovered parts of the body, that the Chigger invasion usually produces a considerable irritation of the lymphatics in its neighbourhood, and that it also attacks rats. [His assertion that the geographical distribution of the insect covers the active foci of the disease is scarcely correct.]

J. H. S.

BALLIANO (Arturo). **Un Caso di Lebbra all'Ospedale Militare Principale di Savigliano.** [Case at the Chief Military Hospital at Savigliano (Piedmont).]—*Giorn. Med. Milit.* 1914. May 31. Vol. 62. No. 5. pp. 349–366. With 4 figs.

A detailed clinical account, with general discursus on the spread of leprosy, of a case of mixed type coming from Brazil. It is worth remark that even two centigrammes of pilocarpin subcutaneously did not induce sweating, which was ordinarily almost absent not only in the anaesthetic, macular or nodular areas but also over the whole skin, even where apparently healthy.

J. H. S.

BALLIANO (Arturo). **Un Ascaro affetto da Lebbra all'Ospedale Militare Territoriale di Tripoli.** [Case of Leprosy in an Askari at Tripoli Military Hospital.]—*Giorn. Med. Milit.* 1914. Nov. 30. Vol. 62, No. 11. pp. 930–932. With 1 plate.

Clinical account of tuberculous leprosy in a native of Eritrea, fairly typical but with no nodules on the ear-lobes. Besides progressive weakness the early stages were noticeable for hyperaesthesia of hands and feet, to such a degree that the inequalities of the road, such as small stones, caused severe pain on walking. No change observed in the tongue, mucosa of mouth or nose, nor in the conjunctiva ; loss of thermal sensibility in both lower limbs, and in zones on trunk and arms, but tactile and pain sensibility maintained.

J. H. S.

SERRA (Alberto). **Su la Broncopolmonite Leprosa.**—*Sperimentale.* 1914. Dec. 11. Vol. 68. No. 5. pp. 661–684. With 1 plate.

A detailed account of the pulmonary condition before and after death in a case where the lesions appear to have been due to the leprosy bacillus alone and not to a concomitant tuberculosis. The disease was extensive throughout the body, but in the one lung was found a chronic bronchopneumonia with distinct small hard scattered foci and on the same side a chronic nodular pleurisy. Numerous cultures from lung, pleura and other parts of the body were all negative, and inoculations with pulmonary nodules, peribronchial glands, etc. into the eye of rabbits and the peritoneum and subcutaneous tissue of guinea-pigs were also negative. The affected tissues were full of acid-fast rods having the characters of leprosy bacilli. During life Serra failed with the tuberculin cuti- and ophthalmo-reaction to get a positive result, and frequent sputum examinations were always negative.

He has only once in 15 cases of leprosy (7 anaesthetic, 3 tubercular, 5 mixed) obtained a positive tuberculin reaction, and that in a case which subsequently developed a genuine tubercular phthisis, and he thinks that pulmonary leprosy is not only possible but also not infrequent.

J. H. S.

JEANSELME (E.). **De l'Uréthrite Lépreuse.**—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 557–559. With 1 text fig.

Urethritis due to leprosy is mentioned but rarely in the literature, and Jeanselme describes a case in which he found the glans covered by lepromata, of which one around the meatus had infiltrated the walls of the urethra. Pressure expressed a few drops of a purulent fluid in which were found leucocytes stuffed with acid- and alcohol-fast rods, typically lepra bacilli. Jeanselme's attention was drawn to it by difficulty in micturition, and he believes that this method of bacillary discharge is much more common than is generally believed.

J. H. S.

KHOURY (Alfred). **Deux Cas de Vitiligo Syphilitique. Importance de la Pathogénie Syphilitique du Vitiligo dans les Foyers Endémiques de Lèpre.**—*Bull. et Mém. Soc. Méd. de Paris.* 1914. July 16. 3e Sér. Ann. 30. No. 25. pp. 85–89. With 1 text fig.

A syphilitic origin of vitiligo is coming more and more to recognition, and Khoury adduces two cases in which the connection appears distinct enough. It is, however, difficult in countries where leprosy is endemic to distinguish the vitiligo of syphilis from that of leprosy, and here the Wasserman reaction may be of no assistance. Certain points may help in the differential diagnosis. In leprosy the spots are rarely very large, they take years to develop and spread, are rarely so completely colourless and in their advanced stages are nearly always accompanied by local disturbances of sensation. Further, they are usually of quite secondary importance to the other evidences of the disease, whereas the vitiligo of syphilis may be almost the only manifestation, and is usually the most prominent one, present.

J. H. S.

FALCÃO (Zeferino). **Lepra Unilateral.**—*Med. Contemporanea.* 1915. Feb. 15. Vol. 33. No. 7. pp. 49–52. With 4 figs.

An account of a case of leprosy in a man aged 45 in which the lesions were exclusively situated on the left side of the body. There was a nodule on the left cheek and another on the left side of the chin, terminating abruptly in the middle line, two similar nodules on the left forearm and the left thigh and one as large as the palm of the hand on the left buttock. The fingers of the left hand were strongly clawed, and there was extensive anaesthesia of the hand and forearm. These lesions had existed without much alteration, and without any extension to the right side of the body for nearly twenty years.

J. B. Nias.

RIVAS (D.) & SMITH (Allen J.). **The Bacteremic Nature and Laboratory Diagnosis of Lepra.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1914. Nov. Vol. 2. No. 5. pp. 327–332. With 1 plate.

In two cases of leprosy the authors demonstrated acidfast bacilli in smears of blood obtained by pricking the skin in apparently unaffected parts, and also in smears of blood withdrawn from a vein. To 1 vol. of blood they add 10 vols. of 2 per cent. acetic acid, and make slides from the deposit after centrifugation. They state that the bacilli were then found singly or in clumps, in lepra cells, endothelial cells and lymphocytes ; that the acetic acid solution was repeatedly filtered through porcelain and was free from acidfast organisms; and that no acidfasts were found in slides similarly prepared from healthy or tubercular persons. The authors no longer claim that they obtain growth on their trypsinised egg-medium inoculated with leprosy material.

J. H. S.

HURLEY (Victor). **A Case of Leprosy (Mixed Type).** *Med. Jl. of Australia.* 1914. Aug. 15. Vol. 1. No. 7. p. 154.

A case in a Russian Jew of at least three years standing. The source of infection is obscure. The patient had been 28 years in Australia and had seemingly never come in contact with leprosy during that time.

J. H. S.

HEISER (Victor G.). **Leprosy. Its Treatment in the Philippine Islands by the Hypodermic Use of Chaulmoogra Oil Mixture.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1914. Nov. Vol. 2. No. 5. pp. 300–326. With 11 plates and 18 diagrams; & *U.S. Public Health Reps.* 1914. Oct. 16. Vol. 29. No. 42. pp. 2763–2767. [A Shorter Account].

In the Philippines every known method that did not seem dangerous has been tried in turn, most of them without effect. Several cases were apparently cured by X-rays, others by the use of crude chaulmoogra oil by the mouth, but the disease always returned before the end of one year. In 1907 DYER's method of giving chaulmoogra oil was tried. The results were better, but after a few months the nausea nearly always became so great that in spite of every endeavour to avoid this complication, treatment had to be given up. On hypodermic injection the oil was insufficiently absorbed, but with the addition of camphor the results were more successful, and finally the following mixture was used with most satisfactory results :—

Chaulmoogra oil 60 c.c.; camphorated oil, 60 c.c.; resorcin, 4 grams. (Mix, dissolve by aid of heat over a water bath, and filter).

At weekly intervals starting with 1 c.c. increasing doses are given until the limit of tolerance is reached. This varies in each case, and it is apparently better when possible to inject the mixture into large leprous deposits or into a number of smaller infiltrations. No strychnine is given, but saline purgatives freely, and 2 per cent. hot baths of sodium bicarbonate are prescribed every other day with apparently very good effect. This method in twelve cases has given most satisfactory results in all forms of the disease, producing apparent cure in some, great improvement in others and arrest in all, and it is hoped that a more extensive trial will confirm the results. The writer notes that he has often been struck with the frequency with which cases of leprosy present histories of scabies. J. H. S.

IREDELL (C. E.). **A Case of Leprosy treated with Radium & Diathermy.** —*Lancet.* 1914. Dec. 5. pp. 1299–1300.

The disease in this case in a doctor was characterised at first by maculae, two lepromes, neuritic affections including local anaesthesia and ulnar pain, and intestinal troubles, both pain and constipation. The maculae passed off spontaneously, as also one leprome. The second leprome appeared to respond to radium applications. But the effect of diathermy on the ulnar pain and the abdominal condition was very definite. The former was greatly relieved in 20 minutes, and to a much greater extent than by hot baths, etc. for the arm, and the treatment produced copious evacuation of the bowels without any drugs. It would seem that the method is worth a more extensive trial, not only as a relief to the pain but as a means towards real improvement in the disease. J. H. S.

COURTNEY (B. J.). **The Treatment of Leprosy by Intravenous Injections of Iodoform.**—*Lancet.* 1914. June 27. pp. 1806–1808.

Twelve patients, four of them purely nodular cases, five purely anaesthetic and three mixed, received intravenously iodoform dissolved in ether over a period of at least three months. The initial dosage was ½ grain twice weekly, and this was increased to 1 grain five times a week. In four of the cases local injections were made in addition into some of the nodules. No change was produced in the anaesthetic cases, four of which were advanced. In the tubercular type a definite improvement took place in three out of the four, and two of the mixed cases were greatly improved in regard to the nodular aspect of the disease. In 6–12 weeks the nodules softened and broke down, discharging a thin pus containing many bacilli, and the leprotic deposits sloughed, leaving a clean surface which healed without difficulty. The improvement was general over the whole body, and not confined to the areas of local injections. The leonine expression disappeared, thickened ears and lips went down, the skin round the ulcers was smooth and normal, and the patients felt themselves markedly better. The change resembled that which occasionally occurs spontaneously in the tubercular type of case, but its simultaneous appearance in five cases, and the extent of the improvement, make spontaneous change an improbable explanation in these cases.

It may be noted that in Sokoto, where the cases were treated, the natives attribute leprosy to the eating of fish. The method of preparation is to open and roughly dry in smoke, but the process is so imperfect that the fish is really often partly rotten. Further it is not with the eating of all fish but only certain kinds of fish that the disease is connected. J. H. S.

WILLIAMS (A. Winkelried). **Case of Leprosy.**—*Proc. Roy. Soc. Med.* 1914. Dec. Vol. 8. No. 2. (Dermat. Sect.). p. 39.

A nodule from the face of a tubercular case was excised, dried, ground, the contained organisms were roughly counted and 2½ millions, and later 5 millions, injected as a vaccine. A reaction followed the last dose, in the form of a transient eruption of erythematous patches; an ulcer on the knee healed up, nasal discharge ceased, the nodules largely subsided, and sensation to pain partly returned. Oleum gynocardiae by the mouth, and local nasal treatment had also been given.

J. H. S.

KÄYSER (J. D.). **Ueber Aetiologie, Prophylaxis und Therapie der Lepra.**—*Dermatol. Woch.* 1914. May 30. Vol. 58. No. 22. pp. 621–635; June 6. No. 23. pp. 651–660.

After an interesting historical account of the spread of leprosy, at the end of which he states that the decline and practical disappearance are certainly not due to attempts at isolation and probably not to any acquisition of immunity, but rather to the general improvement in hygienic conditions, Käyser epitomises the current views on the etiology, etc. of the disease, and gives a general review of its prophylaxis in the light of his experience in Batavia. He recognises the disease to be contagious, but the rarity of this event and the failure of DANIELSSEN and also of PROFETA to confer the disease on any of 31 individuals (including themselves) whom they inoculated with leprous material, show that there must be other conditions besides simple invasion of the bacillus. These conditions are quite unknown, but it appears clear that leprosy is a disease which finds its best soil in the presence of poverty, dirt and the low physique of insanitary surroundings. The real preventive treatment is, therefore, sanitation and cleanliness, and were it possible to ensure even that the already infected were personally cleanly, slept alone, covered their ulcers and never allowed their clothes to be worn or their eating utensils to be used by others, further measures would be almost superfluous. This is impossible in practice. It might be achieved by isolation, but enforced isolation is a measure unnecessarily stringent and in practice cannot be attained in the countries where the disease is most prevalent, scarcely even amongst the civilised. It is probably impossible to lay down a rule of procedure that would be practicable in every land. The local habits, circumstances, prejudices of the people in each country must be separately studied, and the prophylactic measures adapted to the local needs.

Käyser adduces as example the measures which were adopted by himself and De JONGE in the Dutch East Indies. They began by studying the conditions in the native quarters of Batavia. The necessity of immediate help was found so general that they instituted a nursing system at once, with the hope that thereby they might also gain the confidence of the natives. This succeeded well with the Malays and Javanese, hardly at all with the Chinese. The cases were pointed out by the natives themselves, and the obvious improvement which followed the regular treatment led to further notification (up to 200 cases) and to a definite betterment of the condition of the sick.

Their experience convinced them that enforced isolation was impossible in Batavia, not only because of the cost but because of the native love of independence, which would have led to general concealment. (The leper in these regions is not a pariah, whom friends would be glad to disclose). They accordingly extended the system of local nursing, and began the foundation of numerous small local homes where lepers might come voluntarily for treatment and temporary isolation without feeling that they were cut off from their friends. They are strongly in favour of such decentralisation and opposed to all compulsory isolation, which has never in their opinion, not even in Norway, achieved its aim. No doubt in civilised lands, where the cases are mostly imported and relatively few in number, some system of nursing homes might be advisable for those who could not carry out treatment in their own houses, but the essence of success must lie in the inducement of highly skilled treatment, not in enforcement. Leprosy is a curable disease, and a sanatorium method of treatment might work as well as in tuberculosis. But drugs are of great value, especially chaulmoogra oil, combined with hot baths and local treatment. The author gives a detailed consideration to the origin and claims of Nastin, and adheres to his opinion that it has not been shown to be of any real value whatever.

J. H. S.

RUCKER (W. C.). **The Necessity for the Establishment of a National Leprosarium.**—*Jl. Amer. Med. Assoc.* 1914. July 25. Vol. 63. No. 4. pp. 297–298.

DYER (Isadore). **The Duty of the Government in Leprosy Care and Control.**—*Ibid.* pp. 298–300.

Rucker, Assistant Surgeon-General in the U.S. Public Health Service, and Dyer draw attention in these papers to the advisability of national legislation for the control of leprosy in the United States, and the former submits a draft of an Act for the establishment of a leprosarium. The official records of the prevalence of the disease are misleading. There are several well-established foci in the country, and the disease is slowly spreading in spite of the almost hysterical dread of leprosy amongst the population. There is no federal mechanism for dealing with it. A recognised leper immigrant is rejected, and should the disease develop within three years of the arrival of an immigrant he may be deported, if it can be proved that he was already infected at the time of immigration. Beyond this there is no national control. In most States the disease is notifiable, and in three there are leprosaria, very costly to maintain because of the small number of patients they take and quite inadequate to the requirements. The need is urgent, not only for the sake of the lepers themselves, since the recognised sufferer is a pariah whose life is a misery, but from motives of self-defence. The only known controls are segregation and cleanliness and, in the impossibility as yet of achieving a general high standard of cleanliness and sanitation, the only remedy is isolation.

J. H. S.

WOLBACH (S. B.) & HONEIJ (James A.). **A Critical Review of the Bacteriology of Human and Rat Leprosy.**—*Jl. of Med. Research.* 1914. Jan. Vol. 29. (New Ser. Vol. 24). (Whole No. 142). pp. 367–423.

This review endeavours so to summarise the literature as to render reference to the original papers unnecessary and, if it does not quite do that, it is still an excellent resumé. It can hardly be itself summarised here, but one or two points may be extracted. Twenty-six authors have given descriptions of leprosy cultures that are worth consideration. These cultures fall into four groups: (1) The diphtheroid, partially acid-fast bacilli: Babes and Kedrowski type: 14 authors; (2) pigment-producing acid-fast organisms: Rost and Clegg: 5 authors; (3) anaerobic acid-fast bacilli: Ducrey and Campana: 3 authors; (4) acid-fast organisms not producing pigment: Karlinski and Duval: 5 authors. The first and second types certainly, and possibly the third and fourth types, are to be found not infrequently in leprous tissue. The diphtheroids have been found in all parts of the world; the pigmented acid-fasts chiefly in the Philippines and Louisiana, but independently and by competent workers. The known variability in the staining reactions of the leprosy bacillus as it occurs in the tissues makes it difficult to assess the value of arguments from the staining reactions of cultures, and the known variability of organisms such as tubercle in regard to acid-fastness accentuates the difficulty. Animal experiments on the whole have given no conclusive results. Direct inoculation of tissue bacilli has rarely given any results and probably none beyond criticism, and the inoculation with culture material, though more often successful, has up to now given nothing definite either. Immunity reactions are still irregular and inconclusive.

J. H. S.

DUVAL (Charles W.). **The Behaviour of the Hansen Bacillus in vitro.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1914. Sept. Vol. 2. No. 3. pp. 185–190.

A statement of the writer's present position on this question of the causal organism of leprosy. The fact that an organism has been cultivated from leprous tissue means little in itself. Most leprous lesions on the surface of the body contain extraneous organisms. When these are banal cocci or other well-known bacteria they present no difficulty; but many lesions contain diphtheroid or streptothrical forms and acidfast rods, and these are the source of confusion. Such organisms occur freely in definitely non-leprous lesions, and are often capable of cultivation. They have been found by LANFORD, HARRIS and WADE in chronic acne, tuberculosis of lungs and cervical glands, sporothricoid gummatoid lesions, lymph nodes and spleen in lymphosarcoma, in the skin lesions of pellagra, etc.; it is remarkable in fact how seldom they are absent. The isolation of such organisms from leprous lesions means practically nothing. Further, according to Duval, these organisms cannot be distinguished by experimental or serological methods from saprophytes which have long been well-known. He has therefore attempted to obtain cultures from leprous tissue, in which such organisms did not occur. He rejected all cultures in which appeared diphtheroid, streptothrical or acid-fast rods not morphologically quite like the tissue Hansen bacilli, and has five times isolated acidfast bacilli closely resembling the organisms found in the lesion itself. These he regards as the true *B. leprae*.

Absolute identification of his bacillus with that of Hansen he realises to be at present impossible, because the experimental animal lesion and the serum reactions are not specific, either for his or for any other of the so called leprosy bacilli, and his organism does not, any more than they do, satisfactorily give such tests as would prove causal relationship. His belief therefore rests solely on the morphological and tinctorial characters of his organism, and the fact of its isolation, in five instances, in pure culture from leprous tissue. In culture it has retained its characters unchanged for two years. It invariably resists decolorisation in 30 per cent. nitric acid followed by 95 per cent. alcohol, or in Gabbett's solution, and is as resistant as the tubercle bacillus, whether dead or alive. It varies from a solidly staining rod with tapering or swollen ends to an irregular, beaded, slightly curved and slender bacillus. Short bipolar forms with clear centres are common, also solidly staining spindles with very swollen centres, and the occurrence of these two forms is characteristic of the organism. Multiplication occurs in excised leprous tissue at 25°–37° aerobically, usually readily enough if autolysis occurs, but always slowly, 8–10 weeks elapsing before macroscopic colonies appear. Subculture on artificial medium occurs only when the medium contains split products of animal protein and always very slowly.

J. H. S.

JOHNSTON (John A.). **Contribution to the Bacteriology of Leprosy. Preliminary Note.**—*Philippine Jl. of Sci.* Sect. B. Trop. Med. 1914. June. Vol. 9. No. 3. pp. 227–230. With 1 plate.

Johnston has twice cultivated post-mortem from the spleen of lepers a non-acidfast streptothrix, and from animals inoculated with this organism (apparently identical in the two cases) has occasionally recovered acidfast rods. Details of the culture, etc. are given, but the investigation is not yet complete.

J. H. S.

KENDALL (A. I.), DAY (A. A.) & WALKER (A. W.). **The Metabolism of "Lepra Bacillus", Grass Bacillus, and Smegma Bacillus in Plain, Dextrose, Mannite and Glycerin Broths. Studies in Acid-Fast Bacteria. V.**—*Jl. of Infect. Dis.* 1914. Nov. Vol. 15. No. 3. pp. 439–442.

The writers had previously found that avirulent rapidly growing tubercle bacilli developed two phases of growth on broth, either with or without the addition of glucose, mannite or glycerin. The first phase was characterised by an increased accumulation of ammonia up to a maximum in the medium, the second by the gradual diminution and disappearance of this ammonia. In this respect they found the grass and smegma bacilli to agree with tubercle, but DUVAL's leprosy bacillus scarcely produced any ammonia at all.

J. H. S.

Mercier (Charles A.). Leper Houses and Mediaeval Hospitals. Lectures 1 and 2. Being the "Fitzpatrick Lectures" delivered before the Royal College of Physicians, London.—*Glasgow Med. Jl.* 1915. Jan. Vol. 83. (New Ser. Vol. 1.) No. 1. pp. 1–20; Feb. No. 2. pp. 81–103 & *Lancet.* 1915. Jan. 2. pp. 33–36; Jan. 9. pp. 89–92. (Abstract).

It is known that there was at least one leper house in Constantinople in the 4th century, and most probably there were others in existence previously of which we have no record. They were not exactly hospitals in the modern sense. The object of their formation was not so much the treatment of the afflicted as their compulsory isolation and although the inmates were usually humanely and sometimes munificently treated, there were rigid penal rules against their leaving their appointed seclusion. The leper on entering such a house withdrew from the world, his goods were disposed of, his wife might marry again, and he became in all respects as one dead. Such segregation is a very ancient practice. It may have been due originally to the belief that the leper is one marked by God as accursed, but certainly the idea of contagiousness is of very ancient standing, and the eventual great development of leper houses was probably an attempt to control the spread of the disease. In the 13th century there were reckoned to be 2,000 such houses in France, and there is ample evidence of the enormous prevalence of the disease in the Middle Ages. Every rank of society was affected by it, and it took the place which pulmonary phthisis occupies to-day.

Its decline was much more rapid than its long centuries of severity might have suggested. In France no leper houses were founded after the 14th century, and in England (where it was probably never so widespread) very few after the 13th century, and by the 15th century patients were so few that most of the houses were being closed and converted to other uses. It is very difficult to account for this decline. The isolation practised, though much more thorough and general than the sanatorium isolation of phthisis to-day, can hardly have been more than a contributory cause, and no really satisfactory explanation has yet been brought forward. Mercier propounds the interesting hypothesis that the phthisis of the present day is the lineal successor and direct descendant of the leprosy of the Middle Ages. Phthisis was not then the scourge it is now, and has increased since leprosy disappeared, and the well-known resemblance between the causal organisms lends an attractive plausibility to the suggestion. But the hypothesis has no solid basis of support.

J. H. S.

Hill (H. W.). The Non-Indentity of Modern Leprosy and Biblical Leprosy.—*Amer. Jl. Public Health.* 1914. July. Vol. 4. No. 7. pp. 605–608.

In Tsaraath, the Hebrew word which the translators of the Bible rendered as leprosy, the lesions are described as being under the skin and not in it, and diagnosis was complete only if the lesions enlarged noticeably in one or at most two weeks. In both points it differs from modern leprosy. Further, it is nowhere stated that Tsaraath was infectious or incurable. The identification of the two Hill considers to be unjustified, and to be largely responsible for the horror with which leprosy is regarded nowadays.

J. H. S.

McCoy (Geo. W.). **Avian Tuberculosis in Man resembling Leprosy. An Abstract of a Report of a Case of Skin Tuberculosis caused by the Avian Type of the Tubercle Bacillus.**—*U. S. Public Health Rep.* 1915. Jan. 1. Vol. 30. No. 1. pp. 14–15.

An abstract of a case (reported by Lipschütz in the *Archiv für Dermatologie und Syphilis*, June, 1914) where the skin was invaded by the avian tubercle bacillus, producing lesions simulating tuberculous leprosy. The patient was a young male adult from Bosnia, a leprosy centre, and the case had been diagnosed as lupus, as syphilis and as a combination of the two. He gave a positive tuberculin reaction and a negative Wassermann. In the early stage the lesions were chiefly ulceration and thickening of the oral mucosa with ulceration of the nose and upper lip, and as the disease progressed pigmented infiltrated spots appeared on the arms and body, with ultimately development of soft elastic subcutaneous tumours here and there. The metacarpal bones were carious, fistulae developed from them and two months before death the subcutaneous lesions discharged pus containing enormous numbers of acid-fast and alcohol-fast bacilli, longer than typical tubercle or lepra bacilli but grouped in the manner of leprosy and many contained in leucocytes. They were present in the ulcers on the hard palate, nasal septum and in the internal organs. Inoculation into animals resulted eventually in successful cultures, which were slightly pathogenic for rabbits and guinea-pigs, and markedly for fowls, and there seems no doubt they were avian tubercle bacilli. Human cases of infection with this organism have been reported before several times, but this appears to be the first where the skin lesions were the prominent feature, and the condition resembled leprosy so closely not only in clinical appearance but in the numbers and grouping of the organisms that only cultural and animal tests could establish a diagnosis.

J. H. S.

De Azevêdo (Paes). **A Lepra dos Ratos no Brazil.** [Rat Leprosy in Brazil].—*Brazil Med.* 1913. Aug. 22. Vol. 27. No. 32. p. 333.

Rat leprosy has not hitherto been reported from Brazil. The author, however, found two rats thus affected out of one lot of 64 sent to the San Paulo Bacteriological Institute to be examined for plague bacilli. Out of another lot of 1,185 sent three months later two more rats were found showing signs of leprosy. Inoculations into guinea-pigs proved unsuccessful, as were cultures upon different media, but eight white laboratory rats were inoculated successfully.

J. B. Nias.

MALARIA.

WALKER (Ernest Linwood) & BARBER (Marshall A.). **Malaria in the Philippine Islands. I. Experiments on the Transmission of Malaria with** *Anopheles* (*Myzomyia*) *febrifer* **sp, nov.,** *Anopheles* (*Pseudomyzomyia*) *rossii*, *Anopheles* (*Myzorhynchus*) *barbirostris*. *Anopheles* (*Myzorhynchus*) *sinensis*, **and** *Anopheles* (*Nyssorhynchus*) *maculatus*.—*Philippine Jl. of Sci.* Sect. B. Trop. Med. 1914. Sept. Vol. 9. No. 5. pp. 381–439.

This important paper takes as its text the statement that in the sanitation of the Panama Canal Zone between 100,000 and 250,000 dollars were saved by the knowledge that *Anopheles malefactor*, which breeds in water collections in hollow stumps, resulting from extensive deforestation of the country, was unable to transmit malaria.

The authors therefore affirm that "an antimalarial campaign in any country must be based not only upon accurate information of the anopheline mosquitoes and their distribution, but also upon the experimental determination of the ability of the different species to transmit malaria."

They point out that of the 100 species of Anophelinae now known, probably less than one-third have been definitely proved to be capable of transmitting malaria. As they say :—

> "The remaining species either have not been investigated or the evidence of their susceptibility is inconclusive or contradictory. Furthermore, it has been demonstrated that among the anophelines capable of transmitting malaria the different species vary widely in their susceptibility to infection with the malarial parasite and that the same species may not be capable of serving as vector of all three types of human malaria. Finally, it should not be overlooked that the same species of anopheline may vary in its susceptibility to infection with the malarial parasite in different countries or under different ecologic conditions. Such variations have been recorded in the susceptibility of *Glossina morsitans* to infection with *Trypanosoma rhodesiense*. A similar variation in susceptibility may account in part for the contradictory results obtained by different authors in their dissections of, or experiments with, certain anopheline mosquitoes."

The authors discuss the two methods of determining the susceptibility of an anopheline to infection with malarial parasites, and decide that the method of experimental infection, as opposed to the mere dissection of mosquitoes caught in houses harbouring cases of malaria, is the more reliable.

They consider that if a mosquito can be infected, and if the parasites develop sporozoites which reach the salivary glands, the evidence that this mosquito is a carrier is nearly, if not wholly, complete, apparently rendering unnecessary feeding experiments on healthy subjects. The importance of instituting careful comparative tests for the purpose of determining the relative susceptibility of different species of anophelines is insisted upon, a line of enquiry which has been largely neglected in the past. The authors indicate how such a research should be carried out, and state that while susceptibility to infection is the most important factor in determining the part played by any species of mosquito in malaria transmission, the questions of geographical distribution, of prevalence of the species, of habitat in relation of human dwellings (domesticity), of avidity for human blood, all merit consideration and must be determined separately for each species.

A list of Philippine anophelines is given. Of these the following five formed the subject of experiment:—*Anopheles febrifer* Banks, sp. nov., *Anopheles rossii* Giles, *Anopheles barbirostris* van der Wulp, *Anopheles sinensis* Wiedemann, and *Anopheles maculatus* Theobald emend. Stanton. Two of these were not hitherto regarded as Philippine species at all, as shown by their absence from the above-mentioned list, and one, as will be noted, is a new species. An account of all these anophelines, with notes on their synonymy and breeding habits, follows, and this is of special interest in view of recent papers by STANTON and STRICKLAND on Malayan species. [See this *Bulletin*, Vol. 2, pp. 650–1.]

A lengthy section deals with methods. All the mosquitoes used were collected as, and bred from, larvae, and useful hints are given on the collection of larvae, stress being laid on the necessity of securing very large quantities of the wrigglers. The method used for breeding the imagines from the larvae is detailed. After several failures the authors discovered the value of filling the bottom of the cage with washed sand. [Although they do not mention the fact, it is evident that experience led them to adopt a technique resembling that employed and figured by EYSELL.*]

In selecting patients for infecting the mosquitoes care was taken to see that gametes existed in the blood in sufficient numbers and mention is made of DARLING's estimate, which is to the effect that the limits of infectiousness of man to mosquitoes is about 1 gamete to 500 leucocytes, or 12 gametes to a cubic millimetre of blood. In all cases an effort was made to obtain patients with as high a gamete count as possible. The technique for infecting the mosquitoes is fully described, as is that for mosquito dissection. [In this connection one may note that the authors were apparently not acquainted with the "bile method" recommended by PERRY,† which is said greatly to facilitate insect dissection.]

The account of the experiments themselves is purposely given in great detail both in the form of tables and in the text. In a brief summary it is only possible to indicate the various points which are discussed more or less fully by the authors. Thus there are notes on the development of anopheline larvae in captivity; on the proportion of females to males amongst the anopheline bred from larvae in captivity; on the longevity of anophelines in captivity, a fair proportion surviving for from 5 to 18 days; on the avidity of the several species of anophelines for human blood, *Anopheles sinensis* taking first place; and on certain other matters such as the gamete count and the influence of quinine on the percentage and intensity of infection of the mosquitoes. In the quantities in which it was taken by the patients it did not appear to have any influence whatsoever.

There were 184 experiments in all, and 1,287 female anophelines were dissected, of which 205—or 15·92 per cent.—contained oöcysts in their mid-guts or sporozoites in their salivary glands. A table gives the percentages of infection for the five different species, but it is to be noted that there were not nearly so many *A. sinensis* and *A. maculatus* examined as of the remaining three species.

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*MENSE's *Handbuch der Tropenkrankheiten*, 2nd Edition. Vol. 1, p. 129.

†*Paludism.* No. 5. Sept., 1912; and this *Bulletin.* Vol. 1, p. 117.

Other tables show the infections with the different species of malarial parasites and give details with regard to salivary gland infection, including information as to the date after feeding on which sporozoites were found in the glands.

In their own summary the authors discuss some interesting points, but here it is only necessary to quote their conclusions.

They state that "the importance of the 5 species of Anophelinae, investigated in the transmission of malaria in the Philippines, can be roughly estimated as follows :—

"*Anopheles maculatus* is probably a moderately susceptible, semi-wild species, with a moderate avidity for human blood ; but on account of its very local distribution it probably plays a very small part in the transmission of malaria in the Philippines, especially in the lowlands. It is said to be primarily a highland species, and if it should be found to be more prevalent in the mountain provinces it might prove to be of importance in the dissemination of malaria in those regions.

"*Anopheles sinensis*, has a low, if not negative susceptibility. It appears from the literature, as well as from our own observations, to be extremely localised in its geographical distribution in the Philippines ; it is scarce, and is a relatively "wild" species. Therefore, while the few experiments made with it showed this species to have a relatively high avidity for human blood, it is probable that its part in the transmission of malaria in the Philippines is negligible.

"*Anopheles barbirostris* stands the lowest in our experiments in its avidity for human blood and it is a relatively "wild" species. It appears to have a wide but scattered distribution in the Philippines, and its susceptibility to infection with malarial parasites is rather feeble. On the whole, it is probable that this species plays a subordinate part in the spread of malaria in these Islands.

"*Anopheles rossii* is one of the most domestic of the anophelines, with a relatively high avidity for human blood. It is very widely distributed, especially along the coast and lowlands, and is relatively prevalent. Its susceptibility to infection with the malarial parasite is rather low. It is possible that this species may play a certain rôle in the dissemination of malaria, especially along the extensive coasts of this Archipelago.

"*Anopheles febrifer* is both a "wild" and also a domestic species in so far as shaded breeding places are afforded, with a relatively high avidity for human blood. It is by far the most susceptible among the 5 species investigated, and is probably the most susceptible species in the Philippines. If investigations, which are now being carried on by one of us (Barber), prove it to be as widely distributed throughout the Archipelago as it is in Laguna Province, *Anopheles febrifer* is the most important mosquito concerned in the epidemiology of malaria in the Philippine Islands."

[This valuable paper embodies the results of a long, careful and troublesome piece of research and will serve as a very useful guide for those who wish to carry out work on similar lines elsewhere. In a review of this kind it is not possible to do full justice to it and the original should be consulted by all workers on the experimental transmission of malaria by anophelines.]

A. Balfour.

STANTON (A. T.). **Anopheles and Malaria in the Oriental Region.**— *Far East Assoc. Trop. Med. C. R. Trois. Congrès Biennal. Saigon.* (1913). 1914. pp. 514-519.

In this useful paper Stanton, following the example set by KNAB in America, endeavours to bring order out of chaos as regards the nomenclature of the anophelines belonging to the Oriental Region. He also furnishes information as to which species have been definitely proved to be malaria carriers. In the first place he considers the

35 species found in the Malay Peninsula, and in the following tables indicates the valid species, the synonyms and the errors which have been made in identification :—

I.—Valid Species.

aitkeni, James.
albirostris, Theobald.
albotaeniatus, Theobald.
aurirostris, Watson.
asiaticus, Leicester.
barbirostris, Van der Wulp
fuliginosus, Giles.
kochi, Dönitz.
leucosphyrus, Dönitz.
ludlowi, Theobald.
maculatus, Theobald.
nigrans, Stanton.
rossi, Giles.
tessalatus, Theobald.
umbrosus, Theobald.
watsoni, Leicester.
wellingtonianus, Alcock.

II.—Synonyms.

annularis, Van der Wulp = *sinensis*, Wiedmann.
elegans, James = *leucosphyrus*, Dönitz.
fragilis, Theobald = *aitkeni*, James.
halli, James = *kochi*, Dönitz.
karwari, James = *nigrans*, Stanton.
leucophyrus, Leicester = *leucosphyrus*, Dönitz.
minutus, Theobald = *sinensis*, Wiedemann.
nivipes, Theobald = *fuliginosus*, Giles.
ocellatus, Theobald = *kochi*, Dönitz.
peditaeniatus, Leicester = *sinensis*, Wiedemann.
separatus, Leicester = *sinensis*, Wiedemann.
treacherii, Leicester = *aitkeni*, James.
vanus, Walker = *sinensis*, Wiedemann.

III.—Errors in Identification.

listoni, Liston for *albirostris*, Theobald.
punctulatus, Dönitz for *tessalatus*, Theobald.
Willmori, James for *maculatus*, Theobald.

[*A. sinensis* seems to have been omitted from the list of valid species.]

It appears that the anopheline fauna of Sumatra and Java were described separately by Professor DOENITZ about the same time that THEOBALD was dealing with those of Malaya. English speaking workers followed the latter's nomenclature and hence confusien has arisen, as in many cases Professor DOENITZ's descriptions were published first.

In the second place, Stanton examines and reports upon the records of malaria infection in anopheles. His statements may with convenience be tabulated :—

Observer.	*Country.*	*Species.*
JAMES	India	*culicifacies*, Giles. *fuliginosus*, Giles. *listoni*, Liston. *maculipalpis*, James & Liston. *stephensi*, Liston.
CHRISTOPHERS	Andaman Islands	*ludlowi*, Theobald.
SCHUEFFNER and DE VOGEL	Sumatra	*rossi*, Giles.
MIYAJIMA and KINOSHITA	Formosa	*listoni*, Liston. *annulipes*, *sinensis*, Wiedemann. *formosaensis*
LEICESTER, JAMES and STANTON	Federated Malay States	*maculatus*, Theobald. *nigrans*, Stanton. *umbrosus*. *fuliginosus*, Giles. *albirostris*, Theobald. *sinensis*, Wiedemann.

A consideration of the *listoni*, *Nyssorhynchus* and *rossi* groups follows. There has been much argument about the last named, and further evidence is required from Drs. SCHUEFFNER and De VOGEL who are chiefly responsible for incriminating *rossi* as a malaria carrier.

Stanton mentions those anophelines which he has examined with negative results and concludes by stating that, so far as malignant malaria is concerned, the small brown species, i.e. *listoni*, *culicifacies* and *albirostris* are chiefly to blame in the Oriental region.

Next comes the *Nyssorhynchus* group, comprising *maculatus*, *fuliginosus* and *stephensi*.

The part played by *ludlowi*, *sinensis* and *umbrosus* is not so clear and seems to merit further research.

A. B.

BASS (C. C.). **A Discussion of Malaria Carriers and the Important Rôle they play in the Persistence and Spread of Malaria.**—*Southern Med. Jl.* 1915. Mar. Vol. 8. No. 3. pp. 182–184.

Bass reminds his readers that people actually suffering from malaria are quite a minor factor in the spread of that disease. He goes on to say that persons who are not ill and have not been ill of malaria are the chief malaria carriers, though it is also true that persons who have recovered from an attack of malaria frequently remain carriers for many months or perhaps years.

He mentions rather a remarkable case where "in one instance, by centrifuging the defibrinated blood drawn from a patient we were able to collect a measurable quantity of pure crescents free from blood cells (except those attached to the individual crescents). The quantity obtained was approximately 1-160th of the quantity of blood from which they were recovered, or one c.c. from one hundred and sixty c.c. At this rate the entire blood of an average sized man would contain about thirty-five c.c. of pure crescents. In spite of this large number of crescents, the patient was up and about the ward and anxious to be discharged. He had not had fever since eight days previously. Asexual plasmodia were demonstrable during the attack of fever."

It is also worth while quoting another statement which runs as follows :—

"If we estimate the amount of malaria plasmodia in some of these cases we must conclude that it is comparatively a non-toxic organism after all. A case that recently came to my attention had an average of one parasite to every two and one-fourth red cell in his peripheral circulation. Assuming that the volume of each mature schizont is as great as that of a red blood cell (and it is actually considerably greater), this patient would have had by the end of forty-eight hours approximately three pints of malaria plasmodia. As a result of prompt quinine treatment he was living at the end of forty-eight hours with fair prospect of recovery, and had only an occasional sickly-looking parasite in his peripheral blood. I have known several cases to recover when every fifth to tenth red blood cell contained parasites, and there was as much as from half a pint to a pint of plasmodia produced every forty-eight hours."

The mechanism of malaria immunity is briefly considered, as is the influence of insufficient quinine treatment in producing gametes and hence carriers. "It is often found," says Bass, "that there are three to five or more times as many people who have plasmodia in their blood, in a community, as there are who are ill or have been ill with malaria. The carriers are not sick and will not get sick unless special conditions favouring development of malaria plasmodia in them should arise." In other words these persons have become infected and the infection has gone on to gamete formation without any clinical symptoms having shown themselves.

[While no one will deny the importance of carriers, it is at least open to question if the author's statement, that persons *who have never been ill of malaria* are the chief carriers, is correct. In the past the experience appears to have been that chronic malarics who have had one or more attacks of acute malaria, who harbour gametes in abundance, and who are anaemic or suffering from the effects of the disease, constitute the most dangerous carriers. In the light of Bass's statements it would seem that further research upon this point is very necessary.] A. B.

JAMIESON (Sydney). **Malaria arising in a Non-Malarial District.**—*Med. Jl. of Australia.* 1915. Feb. 20. Vol. 1. 2nd year. No. 8. pp. 163–168. With 1 fig.

An account of a case of simple tertian malaria occurring in the person of a scrub-cleaner and cutter in a district of New South Wales. Although anophelines are known to be present in this part of Australia there is no evidence of previous locally acquired malaria there. The author, although he does not indicate how infection was acquired in the case he describes, points out the danger to which the population of New South Wales is exposed at the present time when a considerable number of malaria-infected soldiers is returning from New Guinea.

A. B.

SPENCER (H. A.). **Malaria and Malarial Affections.**—*Med. Jl. of S. Africa.* 1915. Jan. Vol. 10. No. 6. pp. 107–110.

In this paper the author suggests the possibility of malaria occurring in Pretoria, and explodes erroneous ideas as to the part which altitude *per se* has been supposed to play. He then shows how rarely typical cases of malaria are encountered at Middelburg in the Transvaal. Rigors occur in less than half the cases coming under notice and in his experience two of the most suspicious symptoms are bronchial catarrh and "bone-pains." The former is often associated with a cough coming on periodically at night. The latter occur chiefly in the tibiae or in the head or shaft of the femur, or of the humerus, *i.e.* the bones where marrow cavities are most common. Spencer thinks the pains are due to an infection of the bone marrow, which forms a favourite and suitable nidus for the growth of the parasite. Both these conditions rapidly clear up under quinine treatment.

[The author seems to rely too much upon the therapeutic test, which is frequently fallacious. He speaks of the difficulty of taking smears from children. Those taken often showed no parasites, sometimes only masses of pigment. He does not seem to have carried out differential leucocyte counts and this rather detracts from the value of his interesting observations.]

Amongst these there is an account of facial and frontal neuralgia complicated by an occipital headache, a symptom he associates with malaria, and he gives a record of other difficult cases.

He thinks the catarrhal conditions, which may also affect the alimentary tract, are due to the mucous membranes being concerned, like the skin, in the separation of malarial toxins from the blood. Thus liquid stools are common in the course of severe and intractable malaria while this, he says, explains further the abdominal pain and tenderness not infrequently encountered in the remittent variety, causing it to be mistaken for enteric fever.

A. B.

WILLETS (David G.). **Malaria in the Philippine General Hospital, Manila, P. I., during the Fiscal Year 1913.**—*Philippine Jl. of Sci.* Sect. B. Trop. Med. 1914. Sept. Vol. 9. No. 5. pp. 441–452.

There is nothing new in this paper, which is a careful analysis of 348 cases of malaria treated in the General Hospital, Manila, in 1913.

Total leucocyte counts are recorded [differential counts are not mentioned], faecal findings and the results of urine analysis are given, and the splenic index is stated. It is instructive to note that albumin, either alone or along with red cells, pus corpuscles or casts, was present in 118 cases although genito-urinary disorders may have been accountable for these results in certain instances.

Although the paper has a certain statistical value it possesses more local than general interest.

A. B.

SOLOMONS (Bethel). **A Note on Malaria as a Complication of the Puerperium.**—*Med. Press. & Circ.* 1915. Mar. 3. New Ser. Vol. 99. No. 3956. pp. 213-214.

This is a paper by a gynaecologist who had his first experience of malaria when attending in Dublin the wife of an officer of the Indian army. She was a primigravida, and the case proved to be one of impacted breech. Some local damage was done at the time of delivery but there was no *post-partum* haemorrhage.

After the birth of the child the temperature rose and kept up and the pulse became rapid and continued so. Both records are given, the highest temperature, 102·2°, being reached on the fourth evening. Bacteriological examinations of smears from the uterus were negative.

It was not until the fifteenth day that the malarial parasite [species not stated] was found. A bacteriological blood culture made at this time gave negative results. When the patient was properly treated with quinine she soon recovered. Solomons mentions that the patient had never told him that she had suffered from malaria. It was only later that she admitted having had an attack two years previously. Naturally septic infection was at first supposed to be the cause of all the trouble [See the record by SEIFERT of a very similar case in this *Bulletin*, Vol. 5, p. 244.]

The temperature curve was hectic in type and there was no hepatic or splenic enlargement, no nausea or sickness. The chart seemed to indicate a double tertian.

The author says that malaria complicating the puerperium is a very rare condition. He found it ignored in some standard text books of tropical medicine and could only obtain four papers in the literature and reference to nine others which were not available in Dublin

[It would seem that the author did not consult this *Bulletin*, for there he would have found records of cases, some resembling that which he has described. His paper is useful in again directing attention to the protean nature of malaria, and its great importance as a complication in traumatic and other conditions.]

A. B.

WRIGHT (Thos. E.), **Thirty Cases of Malaria, Estivo-Autumnal, treated with Quinine Intravenously.**—*Southern Med. Jl.* 1915. Mar. Vol. 8. No. 3. pp. 196–201. With 1 fig.

As the result of treating 30 cases of *P. falciparum* infection by intravenous injections of quinine hydrochloride in proper dilution the author concludes that:

"1. The intravenous use of quinine in doses of 15 grains in a dilution of 250 to 300 c.c. of saline in the hands of a careful, competent physician is safe.

"2. The discomfort to the patient is so slight it becomes a matter of small importance, and in this respect when compared with quinine by mouth or hypodermic is much to be preferred.

"3. The number of doses for the different types of malaria, the proper time to elapse between their administration, the exact dosage and dilution necessary and safe, the permanency of the relief of symptoms, are problems that will be worked out.

"4. The relief from the symptoms in malaria, so often jeopardizing life, may be obtained very promptly, safely and constantly by this method."

Where possible, and in order to avoid reactions the quinine should be dissolved in water which is *freshly* distilled as well as sterile.

The largest number of infusions given to any one case was three, most of the patients getting one or two. Three cases had a relapse, and the author thinks that it is possible that some of the others may also relapse.

A. B.

BEARD (J.); BALFOUR (Andrew). **The Pancreatic Treatment of Relapse Malaria.** [Correspondence].—*Brit. Med. Jl.* 1915. Mar. 6. pp. 449–450; Mar. 20. p. 528.

Beard finds fault with the War Office for not giving his pancreatic treatment of relapse malaria due consideration. His use of trypsin and amylopsin is based upon the view that the organism of malaria cannot live in the presence of these higher ferments, and he cites the results of Major LAMBELLE's investigations as proof of the value of his method [this *Bulletin*, Vol. 3, p. 148.] According to him the treatment is scientific, rapid in action, cheap and highly efficacious.

Balfour, in reply to this letter, points out that Beard appears to have overlooked a paper by FRETZ [see page 362] who treated 19 cases of malaria by injections of amylopsin and trypsin, but had by no means such good results as LAMBELLE. In some cases indeed the treatment appeared to be rather a useless and painful operation, although FRETZ says that his method of administration may possibly have been faulty.

Balfour thinks that, while the method deserves a proper trial, it cannot at this stage be considered "highly efficacious."

A. B.

Barlow (Nathan). Clinical Report of the Anti-Malarial Campaign at Guyamel.—*Amer. Jl. Trop. Dis. & Prevent. Med.* **1915. Mar.** Vol. 2. No. 9. pp. 585–596.

Cuyamel is in Honduras and the plantation of the Cuyamel Fruit Company lies between the coast and the foothills, covers a strip of land over 30 miles long and of variable width, and was intensely malarious. All three types of malaria occurred and every form of malignant malaria was frequently encountered. All methods of preventing human infection were impracticable and so the plan was adopted of preventing infection of the mosquitoes. A record of experiments at the end of the paper show how the data on which this attempt was made were obtained. The facts elicited were :—

"First: *Plasmodium falciparum* does not produce gametocytes in sufficient numbers to be evident in the circulating blood, until at least two or three weeks after clinical symptoms have been manifest. *P. malariae* and *P. vivax*, on the contrary, often have many gametocytes in a specimen taken during the first chill. Second: contrary to the usual statement, the administration of quinine does not cause the appearance of gametocytes at an earlier date, nor does it cause an increase in their number. It is perfectly true that the proportion of gametocytes to other forms is increased under quinine; but this is due to the persistence of the already formed gametocytes and to the fact that the action of quinine does not prevent the development to maturity of the gametocytes, but does destroy the vegetative forms at an earlier date."

It is therefore clear that, in any locality where the prevalent infection is with *P. falciparum*, the discovery of every case in the first week of illness, combined with such thorough treatment that relapse and latency do not result, must lead after some months to an elimination of infected mosquitoes from that locality. The outlook is by no means so favourable in the case of the other two plasmodia, for the discovery must be much more prompt for the efforts made to accomplish any results.

The campaign conducted by Barlow, for a time single-handed and then with one assistant, produced very remarkable results, as will be evident from the table :

	P. falciparum.	*P. vivax.*	*P. malariae.*
Jan. 26th to May 2nd—			
Pure	929	24	4
Mixed	71	61	13
Clinical	800	–	–
June 20th to Oct. 1st—			
Pure	102	43	2
Mixed	5	2	3
Oct. 1st to Oct. 31st—			
Pure	6	0	3

He states that of the six cases of falciparum infection found in October only one originated on the plantation and that "If such results can be obtained among an ignorant, illiterate, nomadic population, in the midst of a tropical jungle, with near-by settlements heavily infected with malaria, it would seem that in an enlightened community, with a stationary population, more or less screening of dwellings, and with at least the amount of mosquito eradication which is produced by the drainage and cultivation of land, that a cooperative effort by physicians to promptly diagnose every case of malaria, and to energetically instruct and reinstruct every patient in the necessity of a sufficiently long course of treatment, to insure against relapse or latency, ought to result in the complete eradication of at last the aestivo-autumnal form of malaria."

Notes on relapse follow in the course of which the author details the plan he has followed for its prevention. Cases of malaria are treated as follows:

"Preliminary laxative, usually calomel, to be followed by a small dose of magnesium sulphate.

"Twenty to thirty grains of quinine bisulphate for two days.

"Fifteen grains daily, for one month.

"Fifteen grains twice a week for two additional months, in cases of aestivo-autumnal infection.

"Rest and light diet during the continuance of the symptoms."

If the quinine therapy proves disagreeable it is combined with sodium bromide, but very few cases have been found in which tolerance was not readily established.

Alcohol is strongly contra-indicated. It accentuates nervous irritability and much smaller quantities of alcohol produce an excited intoxication than the amount required to do so under normal conditions.

Iron and other tonics are only given to those cases which seem to call for it specially. In cerebral cases and those in which severe vomiting precludes oral administration, from 15 to 25 grains of a soluble quinine salt with an equal quantity of sodium bromide and enough sodium chloride to make the solution approximately isotonic are given intravenously in at least 600 c.c. of freshly distilled water. As a rule after one such dose the drug could be taken by the mouth on the succeeding day.

Where intravenous injection was not feasible the intramuscular method was employed but modified in the direction of giving a number of injections in different localities, not more than 3 grains of quinine being given in any one place. This, according to Barlow, led to much greater rapidity and certainty of action. No local trouble resulted in five cases thus treated and kept under observation for six months. On the other hand, dispensary cases have been seen suffering from induration and abscess after intramuscular injection of massive doses. In all these cases the trouble did not arise till after the patients had ceased to be under medical control. The author suggests that the prolonged anaesthetic effect of the quinine prevented the early recognition of the local damage. [He says nothing about possible septicity as a cause.]

The following table shows the results of treatment as regards the occurrence of relapses:

Duration of Treatment.	*Patients.*	*Relapses.*
Less than one month	116	116
One month	246	91 (37 %)
Three months	218	0

The results obtained in this campaign are, within limits, so remarkable and significant that it seems advisable to give the author's conclusions in full, and it is evident that his method should be carefully followed elsewhere and the results duly recorded. He says:

"Quinin in therapeutic doses does not act upon the plasmodium; but upon the red blood cell. It so poisons the cell that it is more susceptible to the action of the proteolytic ferments of the plasmodium, resulting in a premature liberation and destruction of the forms belonging to the cycle of schizogony. This effect persists after the elimination of the quinin, and is lost only by the replacing of the red cells by new-formed ones.

"There is no time particularly favorable for the administration of quinin. It should be given as soon as possible after the diagnosis of malaria is made.

"Moderate doses of quinin accomplish as much as large ones.

"Quinin does not hasten the appearance of the gametocytes, nor increase, even temporarily, their actual numbers.

"The length of time of treatment required to remove *P. falciparum* from the blood is proportioned directly to the duration of the infection; that is, to the age of the brood of parasites. In a very recent infection it is more easily caused to disappear from the circulation than either of the other plasmodia. One of the chief sources of error in diagnosis is the fact that a few irregular doses of quinin may so suppress this form in the circulating blood, that a number of examinations are necessary to find it. On the other hand, a long-standing infection may require months of most careful treatment to remove the parasites from the blood.

"The gametocytes of *P. vivax* and *P. malariae* appear very early in the course of the infection. The gametocytes of *P. falciparum* are not usually evident in the circulation until from three to five weeks after clinical symptoms have been manifest.

"Nothing less than three months of systematic treatment can prevent a satisfactory proportion of the cases of aestivo-autumnal malaria from relapsing.

"In any community, the prompt diagnosis and thorough treatment of every case of the infection with *Plasmodium falciparum* will result, after a few months, in there being no infected mosquitoes in that locality.

"If the immigration of new cases be not too great, it is possible, by this means alone, to eradicate aestivo-autumnal malaria from a given district, even without the aid of mosquito destruction, screening, or systematic quinin prophylaxis."

[Of course in the tropics it is only under special conditions that a systematic quinine therapy of this kind can be carried out, but it should be feasible upon estates, plantations, in military cantonments and other places where the patients are under medical supervision and control. It requires much alertness and patience on the part of the physician, but the results would certainly seem to justify the time and energy expended upon it.]

A. B.

LE PRINCE (J. A. A.). **Malaria Control. Drainage as an Antimalarial Measure.**—*U. S. Public Health Rep.* 1915. Feb. 19. Vol. 30. No. 8. pp. 536–545. With 13 figs.

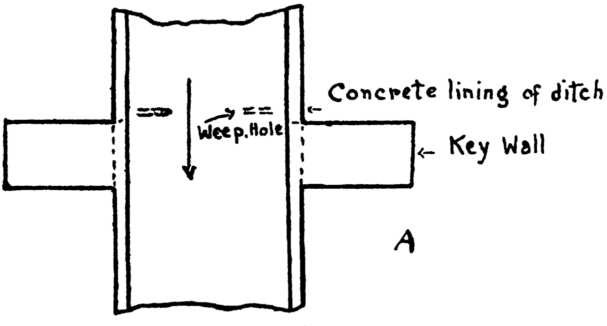
A special type of drainage is required for mosquito control and eradication which, while ensuring drainage of the land, will not provide breeding places. The author discusses his subject under the following heads:—

1. Training natural streams and water courses.
2. Open ditches and intercepting ditches.
3. The installation of permanent lining in ditches.
4. Subsurface drains.
5. Filling.
6. Proper maintenance.

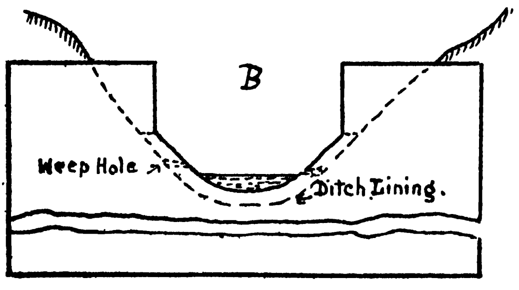
A stream should have steep banks directly above and below the flow line, uniform grade and width, a straight course and be free from grass, sticks, stones, and other obstructions to the current. Directions are given to show how one may deal with streams to make them approximate to this ideal. It is chiefly a question of proper regrading.

There should be as few ditches as possible and they should have clean-cut, sloping edges, narrow bottoms and straight courses. Sharp bends should be avoided and branch ditches should join main ditches at an acute angle or curve. In average soils the slope of the sides of the ditches should be about 45° but is flatter in sand and soft mud. The author gives other common-sense details which are apt to be forgotten in practice.

It is often cheaper to line ditches or parts of ditches with concrete than to be repeatedly regrading, cleaning and oiling them. Stone with cement, mortar, lumber or concrete may be used. For small ditches the lining need only come up to 3 inches above the normal water line. It need not have a smooth or fancy finish which adds to the cost. To prevent side scour above the lining, especially at curves and bends, the outer wall lining may be raised or the ditch may be widened or key walls installed. The latter will also prevent side scour and under scour of linings of straight ditches of heavy grades. Weep or seepage holes are required above the key wall. They should slope towards the centre or bottom of the ditch. They are intended to deal with water behind the lining and should be made in the side walls before the concrete has set. Linings should be U-shaped with sloping sides. (Figs. A and B.)



A.—Plan of key wall.



B.—Cross section of key wall.

Information is given as regards subsoil drainage by means of drain tiles both for the purpose of lowering the water table and for the interception of seepage. A different principle is followed in each case, as is explained by the author with the aid of simple diagrams. He states:—" The advantage of subsurface drain, as compared to the open ditches, is that it is self-cleaning, maintains itself, permits of rapid inspection, needs very little attention, requires no oiling and permits of no exposure of water accessible to mosquitoes."

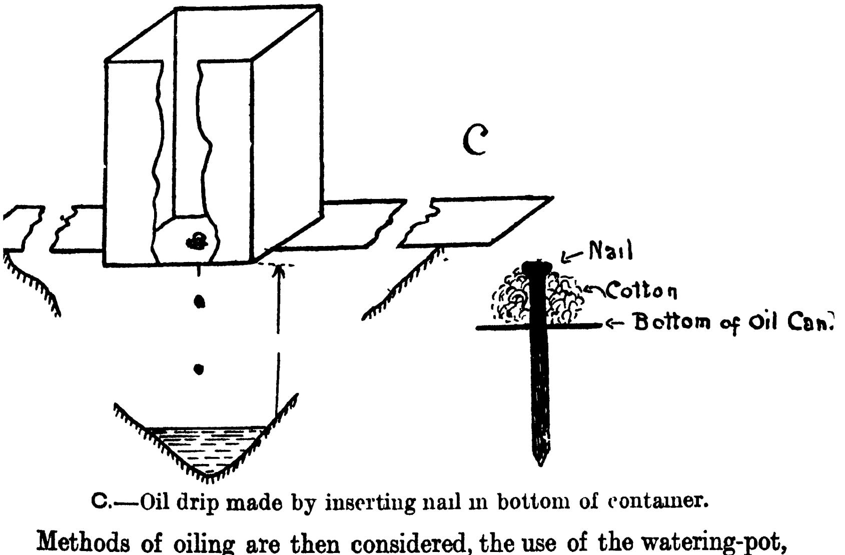
The section on filling for water collections and that on maintenance of ditches scarcely require a summary here. Cinders are very good for filling ground. The use of copper sulphate for destroying algae is mentioned and there are notes as to the type of inspector required and the nature and conduct of his work, the outcome of Le Prince's large experience in the Panama Canal zone.

A. B.

LE PRINCE (J. A. A.). **Control of Malaria. Oiling as an Antimosquito Measure.**—*U. S. Public Health Rep.* Feb. 26, 1915. Vol. 30. No. 9. pp. 599–608. With 5 figs.

After some remarks on the type of oil which may be used, remarks which contain nothing new, Le Prince considers the question of where oiling is applicable. Here again there is not much to note, though in view of the fact that the question of how much oil should be used is frequently asked, the author's statement may be quoted. He says:—

> "It is not practicable to state how much oil should be used per unit of area. The density and spreading qualities of different shipments of commercial oils, and even of oil from the top and bottom of the same barrel, may vary so much as to upset all calculations. All oils spread better in warm weather. Just sufficient oil should be used to form a complete film. Laborers sometimes have difficulty in seeing where a film of kerosene is present on water, but can soon be so trained in the use of other oils as not to apply more oil than is necessary."

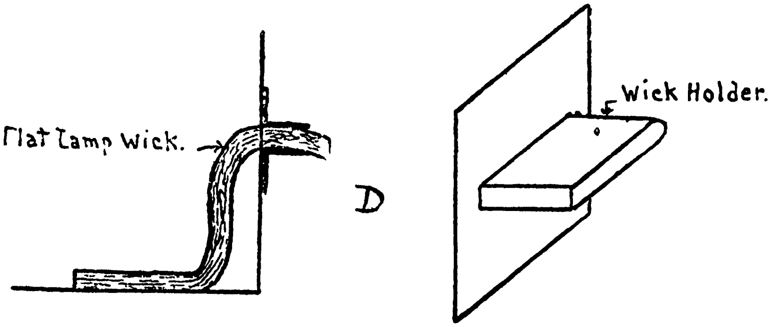


C.—Oil drip made by inserting nail in bottom of container.

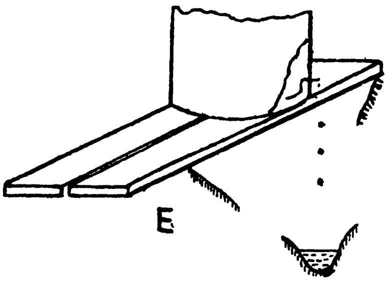
Methods of oiling are then considered, the use of the watering-pot, the knapsack sprayers, spraying machine as used in boats. oil drips, and oil soaked cotton waste being discussed.

The account of the oil drips is useful and practical. A cheap and simple form is shown in the diagram (Fig. C). By pulling the point of the nail downwards and gently pushing it upwards the flow of oil may be decreased or increased as desired.

For thinner oils a 5-gallon can with metal discharge tap may be used, while for the heavy crude oil of asphalt base largely used at Panama, a flat lamp-wick drip was employed in a holder which was compressed or widened as the rate of flow was altered. (Figs. D and E.)



D.—Detail of drip used for heavy oils.



E.—Oil drip for heavy oils.

On ditches or streams having an average width of water surface of 1 foot from 10 to 20 drops of oil per minute are applied. The quantity of oil needed varies, of course, with the local conditions. On long streams or ditches several drip cans may be necessary.

Where the quantity of moving water is too small to warrant the use of a drip-can, a small bundle of oil-soaked cotton waste is placed at the source of the water. A thin film of oil will exude from it for about a week. It can then be re-soaked in oil and used again, the heavier oils being the best for this purpose.

Notes on personnel, inspections and working maps and records conclude a useful, practical paper.

A. B.

Le Prince (J. A. A.). **Impounded Waters. A Study of Such Waters on the Coosa River in Shelby, Chilton, Talladega, and Coosa Counties, Ala., to determine the Extent to which they affect the Production of Anophelines, and of the Particular Conditions which increase or decrease their Propagation.**—*U. S. Public Health Rep.* 1915 Feb. 12. Vol. 30. No. 7. pp. 473–481. With 2 sketch maps.

The survey of these impounded waters, where *Anopheles quadrimaculatus* and *A. punctipennis* breed, was made during the late autumn and the author states that conditions during late spring and midsummer may be entirely different. Naturally the findings possess chiefly a local interest, but it is worth noting that in the lake itself collections of pine needles constituted the most important factor for the production of anopheles larvae. Over 90 per cent. of the larvae and pupae taken were got by dipping among such collections, and it did not matter whether they were near the shore or 2 or 10 feet off it.

The relative importance of places where larvae were found in the lake was in the following order :—

1. Groups of pine needles (when not too closely compact).
2. Débris, consisting of bark, leaves and twigs.
3. Long grass lying on the water surface (only noted at Cedar Creek).
4. Dead leaves of trees floating on the surface (present from September to November).
5. Logs, branches, stumps, etc.

A note indicates that *Anopheles crucians* was present in addition to the other two species, possibly, however, only as adult mosquitoes.

There was a paucity of top-feeding minnows in the lake. Where they did occur anophelines were either very scarce or absent.

Trees left standing in water, if not close together, are not so important in assisting anopheline propagation as are brush, tall grass and saplings.

A plan show the local conditions, but scarcely requires reproduction here.

A. B.

Bass (C. C.). **Report of the Malaria Commission of Southern Medical Association.**—*Southern Med. Jl.* 1915. Mar. Vol. 8. No. 3. p. 201.

Members of the Commission have published about 50 papers during the year, and 25 public addresses have been delivered. A short treatise on malaria is being prepared, dealing with diagnosis and treatment, and this is to be distributed to all physicians in the malaria section.

A. B.

Stephens (J. W. W.). **On the Peculiar Morphological Appearances of a Malaria Parasite.**—*Ann.Trop. Med. & Parasit.* 1915. Mar. 18. Vol. 9. No. 1. pp. 169–172. With 1 plate.

The author describes and illustrates by an excellent plate a peculiar malaria parasite found in a blood slide sent him by Dr. Le Fanu from the Gold Coast. The latter thought that the forms seen were similar to the author's *P. tenue* [see this *Bulletin*, Vol. 3, p. 432].

The film was made from the blood of a native child that came for treatment, and the infection is not a severe one, while the blood cells present no evidence whatever of stretching or distortion, and the peculiar looking parasites occur alike in the thick and thin parts of the film.

In addition, large and apparently quite normal quartan parasites occur, and it is possible to trace a transition from normal ring forms to those in which chromatin particles or strands without any protoplasm are seen in the red cells. Stephens thinks that these forms may be explained in three ways :—

(1) That they are a new species of parasite.

(2) That they are degenerative, i.e., formed in the body under unknown conditions, and so perhaps analogous to the so-called quinine forms of parasites.

(3) That they are artificial, i.e., formed outside the body under unknown conditions.

He considers that the forms showing only chromatin speak in favour of (2) or (3) rather than of the first hypothesis. On the other hand, the presence of normal quartan parasites is against the two latter views. Forms without chromatin were not seen and pigment grains apart from parasites were not encountered in the red cells.

The author thinks that when evidence is forthcoming as to the true nature of these forms light will be thrown upon the question of the validity or otherwise of *P. tenue.* He discusses briefly the remarks of BALFOUR and WENYON, and CRAIG on this subject [see this *Bulletin*, Vol. 5, pp. 53 and 250], and states that an examination of further films from the case of *P. tenue* revealed the presence of quartan parasites and in addition in one film a single pigmented (presumably simple tertian) parasite in an enlarged cell showing Schüffner's dots.

A. B.

i. VAN DINE (D. L.). **The Losses to Rural Industries through Mosquitos that convey Malaria.**—*Southern Med. Jl.* 1915. Mar. Vol. 8. No. 3. pp. 184–194. With 2 figs.

ii. THIBAULT, Jr. (James K.). **A Comparative Study on the Losses to Rural Industries from Malarial Mosquitos.**—*Ibid.* pp. 195–196.

i. The United States Bureau of Entomology selected a plantation in the Southern States for the purpose of making a special and intensive study of malaria on the lines indicated by the title of this paper. It was necessary to choose a locality where such conflicting factors as ankylostomiasis, enteric fever and pellagra were absent, where the soil was highly productive and where the estate was efficiently managed on progressive lines. Such a spot was found in the Delta region of the Mississipi Valley.

The environment and the nature of the soil are described. Negro tenant farmers far outnumbered all other classes on the plantation, and a table shows that there were 74 families with a total of 299 individuals. Males over 18 years of age were considered to work full adult time and calculations are given for females, youths and boys above eight.

A second table shows that from May 1st to October 15th, 1914, this population lost 625·5 working days owing to cases of malaria reported to the doctor. In addition there was a loss of 250·75 days of adult time amongst persons not treated (doubtful cases not included), and a yet further loss of 235·5 days owing to the necessity of workers attending upon the sick in their households.

Thus, during the crop season a total loss of 1,066 days of adult time occurred. [It would seem that the figure should really be 1,111·75 days.]

Other tables follow. An effort was made to estimate the reduction in the yield of corn owing to the loss of working days, but this has not yet been possible. At the same time, the results as regards loss of time are regarded as significant. *Anopheles quadrimaculatus* was the mosquito at fault, and it was found to be partially domestic in its habits. Some notes on its biology complete a paper which is rather out of the common and may be studied by hygienists with advantage.

ii. A somewhat similar investigation on a smaller scale was carried out at Scott, Arkansas, where it was found that patients lost an average of 5·50 days for each attack. Taking also into account an average loss of three days for nursing in the case of each attack, a family lost 8·50 days for every case of malaria.

A. B.

BLACKWATER FEVER.

STEPHENS (J. W. W.) & STOTT (W.). **Studies in Blackwater Fever. III.—The Relationship of Quinine to Blackwater Fever.**—*Ann. Trop. Med. & Parasit.* 1915. Mar. 18. Vol. 9, No. 1. pp. 201-212. With 2 charts & 1 fig.

This paper embodies the results of a statistical examination of the respective times at which quinine is given and blackwater occurs, which was undertaken in order to see what the relationship actually is between the two.

The records were found incomplete. Indeed it was practically impossible to get those which gave a complete quinine history, so the authors were driven to examine as to what relationship existed between the time of the blackwater and that of the *last dose* of quinine. Some of the records gave the onset of the rigor, others the time when the blackwater began. The first is perhaps the more accurate indication of the commencement of the attack, although we do not know how long haemoglobinous urine can be retained. It seems, however, to be generally assumed that such urine is irritating to the bladder.

The three important dates (time of last dose of quinine, of onset of rigor and of first passage of blackwater) were obtained in whole or in part in 372 cases. By the help of tables, charts and diagrams illustrating correlation or fits, the authors explain very carefully the methods they adopted in the research and demonstrate the results obtained.

The charts are reproduced here,* but the original paper must be consulted for the statistical details. By "mode" (*vide* the chart inscriptions) is meant the most usual time.

The authors started with the assumption that the taking of quinine by persons with a certain diathesis is the cause or a cause of blackwater. Acting on this they expected to and did discover a positive correlation between the time of taking quinine and the symptoms of the illness. They also found, as they expected, that this correlation was brought nearer to unity as the figures for the effect were brought more in coincidence with the cause, i.e. as the two "modes" were brought together.

They advance the following possible explanations of this correlation :—

"(1) It is purely accidental, due to the fact that blackwater has a 'natural' mode in the 9 a.m.–12 noon interval. This, as we have said, could be eliminated by seeing whether the same mode existed when quinine was taken at other times than 6–9 a.m. For this purpose we require further cases with the times accurately recorded.

"(2) The correlation is produced by some unknown cause or causes which determine both the fact that the mode of quinine is at 6–9 a.m., and that the mode of the rigors is at 9 a.m.–12 noon. We cannot suggest any such cause.

"(3) The correlation is one of *cause and effect.*

"We believe, then, that, provided (2) can be excluded, that an examination of further cases, in the way we have done here, will decide whether (1) or (3) is the true answer to the question."

It is admitted that the cases are neither sufficiently numerous, nor recorded with sufficient accuracy of detail to warrant a definite conclusion, but the authors believe their work and results indicate how the problem should be attacked in the future, and they comment upon the great importance of such an investigation. A. Balfour.

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* By permission of Professor STEPHENS.

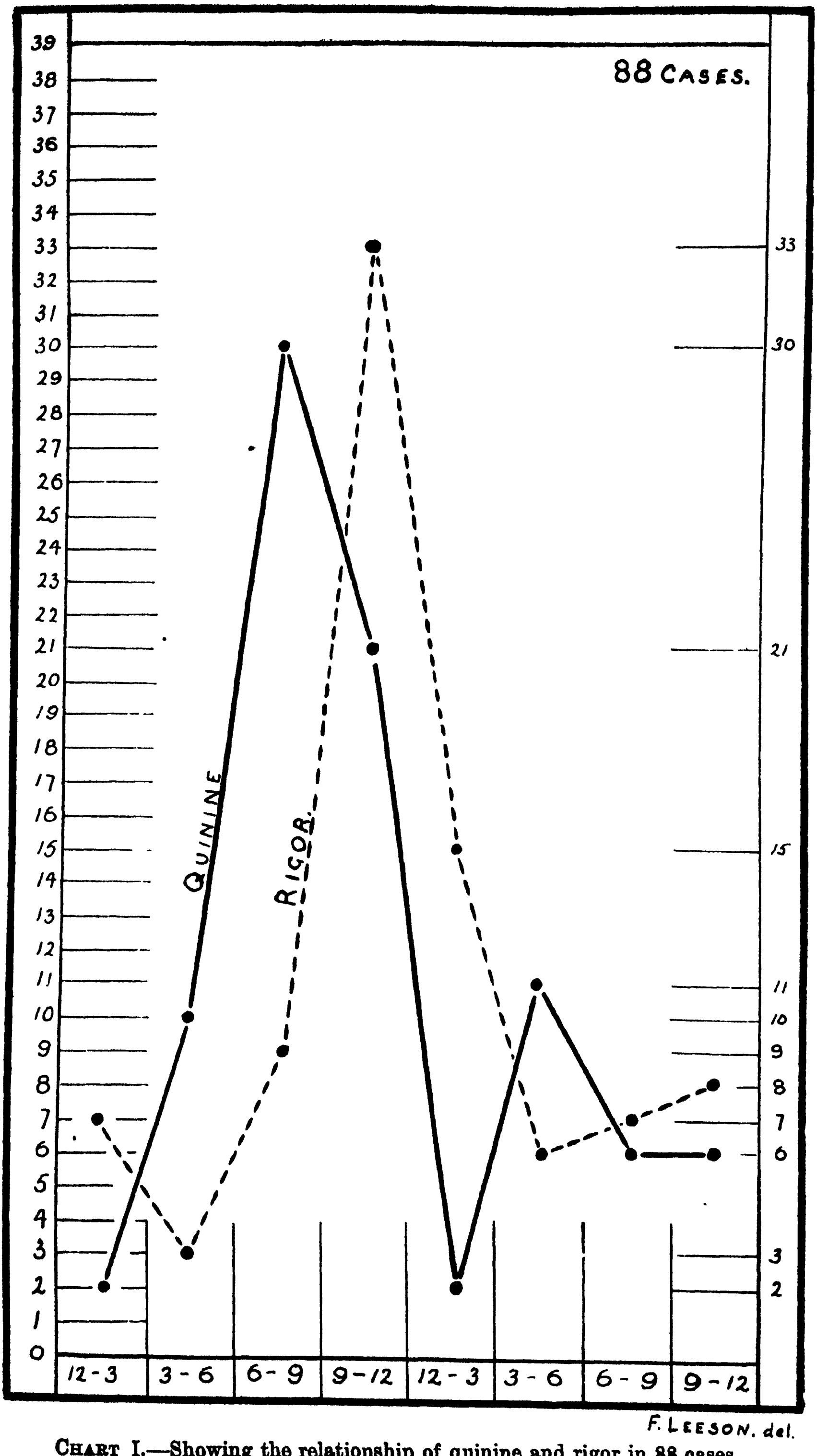
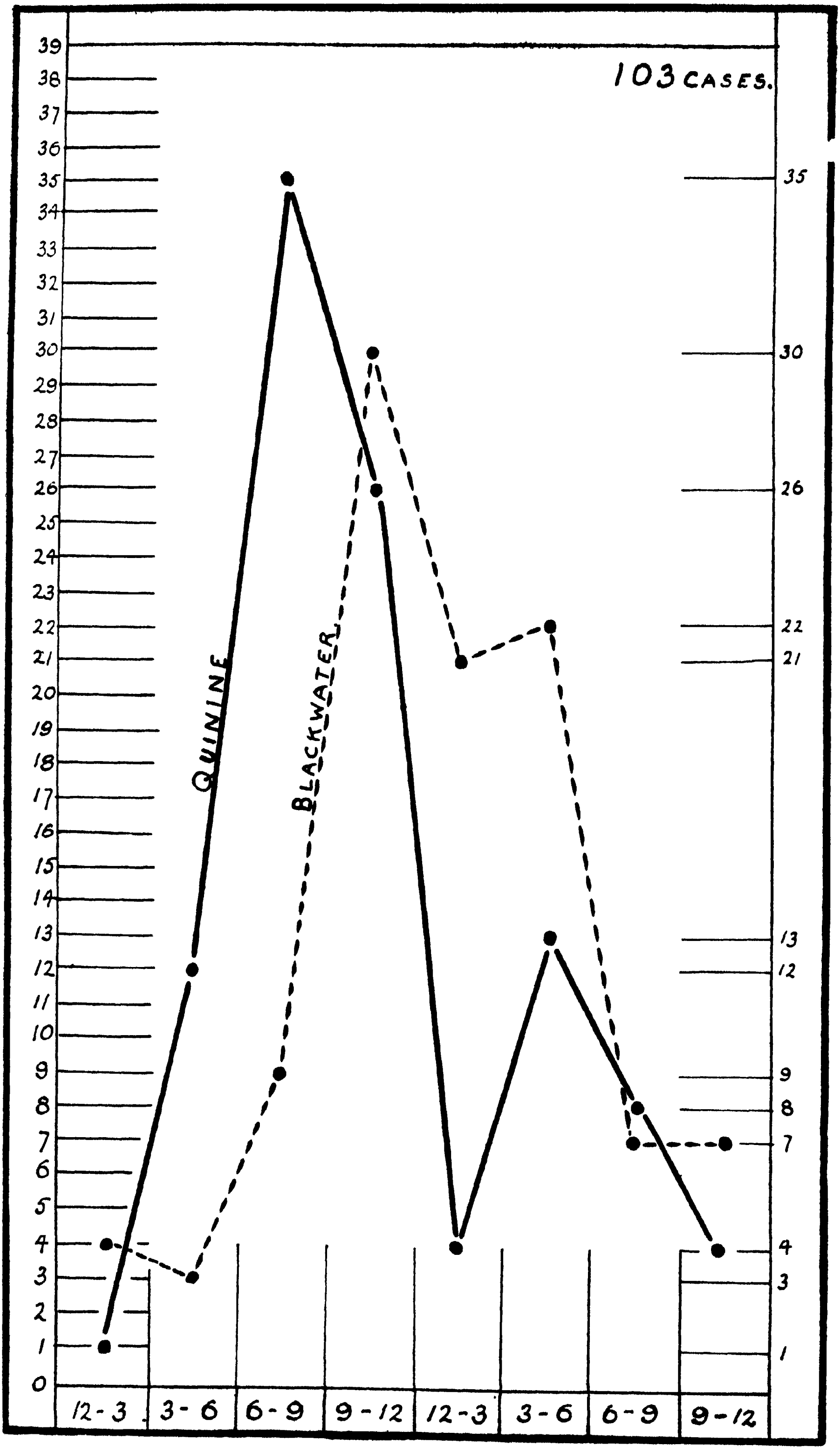


CHART I.—Showing the relationship of quinine and rigor in 88 cases. The mode of quinine is at 6–9 a.m., that of the rigors is at 9 a.m.–12 noon.



F. LEESON. del.

CHART II.—Showing the relationship of quinine and blackwater in 103 cases. The mode of quinine is at 6–9 a.m., that of blackwater is at 9 a.m.–12 noon.

Federated Malay States. Thirteenth Annual Report of the Institute for Medical Research, Kuala Lumpur, Federated Malay States, 1913. [Fraser (Henry), M.D., Director], 1914. Kuala Lumpur: Printed at the F. M. S. Government Printing Office. [Report on Blackwater Fever by Fletcher (W.), pp. 31–52].

Dr. Fletcher records the occurrence of eighteen cases of blackwater fever during the year. When possible the cases were visited and the urine and blood examined.

Eight of the patients were Europeans, six were Indians, three Chinese and one Japanese. All had suffered from malaria and most of them came from notoriously malarious districts. Quinine did not seem to be specially associated with the onset of the attacks. All the cases except two which ended fatally were treated with quinine during the attack. Of three cases treated with small doses one died. Two received 15 grains a day and both recovered. Eleven were given 20 grains or more every 24 hours and of these nine got better. Although there is no evidence that quinine cut short the disease, it did not prolong it.

As regards the presence of malaria parasites, in four cases in which the blood was examined less than 24 hours before the attack, subtertian parasites were found in every instance. In one very mild case crescents and simple tertian parasites persisted in the blood throughout the attack of blackwater fever. In the other cases the parasite vanished soon after the onset ot the disease. Spectroscopic examinations of the blood in five cases were conducted. In one case only were the bands of oxyhaemoglobin seen in the serum. The serum of another case showed the spectrum of methaemoglobin.

In all the cases except two, in which methaemoglobin was present alone, the urine passed during the attack contained oxyhaemoglobin. In four cases this was accompanied by methaemoglobin.

On three of the five fatal cases autopsies were made. The most marked changes were in the liver, there being a profound destruction of the liver cells round the hepatic veins. In the cells of the portal zones there was a dark pigment which contained iron in loose organic combination. In the central zones there were blocks of yellow, iron-free pigment. [Compare this description with that of da Rocha-Lima for yellow fever. See *Beiheft. z. Archiv. f. Schiffs.-u. Trop.-Hyg.*, 1912. Vol. 16, p. 192.]

Experiments were made in three cases with the serum and the blood corpuscles, but the serum from the peripheral blood contained no specific antibodies for other human corpuscles or for washed corpuscles from the same source as the serum. Neither were the blackwater corpuscles found to be more susceptible to lysis or agglutination than normal corpuscles when subjected to the action of normal serum. As the author says, it is unlikely that autolysin would be found in blackwater serum, for when such an antibody passed into the circulation it would be anchored by the corpuscles in the blood stream.

Experiments carried out with watery extracts of the liver and spleen from fatal blackwater cases were not carried very far, and no conclusions can be drawn from such results as were obtained.

Clinical details of the cases conclude the report. In many instances differential eucocyte counts are given, but unfortunately the author in some cases uses the term "small lymphocytes" and in others merely "lymphocytes," so that it is a little difficult to know what he really means by his nomenclature. It would, however, seem that a large mononuclear increase was a feature of all the counts made.

A. B.

JOHNSON (J. T. C.). **Blackwater or Haemoglobinuric Fever.**—*Far East Assoc. Trop. Med. C. R. Trois. Congrès Biennal. Saigon.* (1913). 1914. pp. 497–501.

In this paper the author gives the following list of conditions producing toxic or paroxysmal haemoglobinuria as distinct from the haemoglobinuria of blackwater fever :—

"1. Toxic conditions, as in poisoning by chlorate of potash, carbolic acid, arseniuretted hydrogen, quinine ; also as the result of the action of the venom of snakes, and of such vegetable poisoning as ricin, abrin, muscarin.

"2. As the result of the injection of the blood of one species or genus of animal into that of another species or genus.

"3. In infective disease : septicaemia, typhoid fever, scarlet fever, syphilis.

"4. In sunstroke, frost-bite, and after severe burns.

"5. In certain other conditions, of which the cause is not known and which are referred to as 'paroxysmal haemoglobinuria,' in Raynaud's disease, etc."

The rest of the paper, which deals shortly with symptoms and treatment, contains nothing novel or specially worthy of note.

A. B.

RINGENBACH (J.). **L'Opothérapie Rénale dans la Fièvre Bilieuse Hémogloginurique avec Anurie.**—*Bull. Soc. Path. Exot.* 1915. Mar. Vol. 8. No. 3. pp. 119–121.

The results of the physiological experiments of BROWN-SEQUARD and MEYER induced the author to test the effects of a renal extract called Nephrine in four cases of blackwater fever with anuria. It had previously been tried by AUDIAN, but the latter had employed other measures as well. Ringenbach used only the Nephrine, which is obtainable in ampoules and is administered by hypodermic injection. The quantity in a single ampoule, i.e. 2 to 3 cc., is sufficient for a dose, and each of the four cases recorded received only a single injection. In every instance benefit accrued. Although the anuria had persisted from 14 to 16 hours it ceased some hours after the injection and at the same time the temperature fell notably and the general condition improved. The author thinks that this organotherapy merits further trial in cases of blackwater complicated by anuria.

Nephrine is a solution consisting of one part of pig's renal tissue in two parts of physiological salt solution.

A. B.

Rand (R. F.). Some Experiences in the Treatment of Malarial Fever in Rhodesia.—*Med. Jl. of S. Africa.* 1915. Jan. Vol. 10. No. 6. pp. 103–106.

So far as malaria is concerned there is nothing in this paper calling for special comment or for a detailed summary. As regards blackwater fever in Rhodesia, the author notes that as a country becomes settled the disease tends to disappear and that it shuns the town. For some years past he has not known of any case originating in a permanent resident of the town of Salisbury, Rhodesia, though imported cases frequently occur. In treating blackwater complicated by a high temperature he believes in antimony, given in three grain doses of the pulvis antimonialis thrice daily, or an equivalent quantity of James's powder. He thinks antimony merits a wider use in the treatment of malarial infections. The Dutch settlers employ a decoction of the root of the wild plumbago for blackwater. It has probably a diuretic action.

A. B.

FEVERS IN THE TROPICS.

FULLE (G. B. Carlo). **Ricerche Morfologiche e Biologiche Intorno ai Bacilli Asiaticus 1, Asiaticus 2, Bacterium Columbense (Castellani). (Contributo alla Conoscenza di Alcuni Bacilli del Gruppo Tifo-Coli).**—*Sperimentale.* 1915. Jan. 20. Vol. 68. No. 6. pp. 721–740. With 6

After having made a very exhaustive study of the three organisms *B. Asiaticus* 1 and 2 and *B. Columbense,* isolated and described by CASTELLANI, the author arrives at the conclusion that they are true species belonging to the typho-coli group; the *B. Asiaticus* 1 and 2 being more nearly allied to one another than they are to *B. Columbense.* In their morphological, cultural and serum reactions they differ from all previously known members of the iosarcae group. Numerous tables of agglutination and complemental fixation reactions are given and six microphotographs.

CASTELLANI found the reactions of *B. Columbense* with lactose and milk very irregular; the author found in the strains examined by him that lactose was fermented with gas production, but that milk was rendered alkaline, this reaction separating it from paratyphoid B. The immunity reactions were also quite distinct from paratyphoid B.

P. W. Bassett-Smith.

SCHUEFFNER. **Pseudo-Typhus in Deli. (Variante der Japanischen Kedani Krankheit).**—*Far East Assoc. Trop. Med. C. R. Trois. Congrès Biennal. Saigon.* (1913). 1914. pp. 309–315. With 4 plates.

In 1902 the author observed a peculiar fever in Deli, Sumatra, which had some resemblance to typhoid, but neither reacted to the serum test nor gave the bacillus on blood culture. Since that time the disease has been frequently noted by himself and many others. A similar condition has been found in Japan and the Philippines. In the former the mortality is considerably greater (said to be 30–70 per cent.) than in Sumatra where it is 3 per cent., and the seasonal incidence is different, for in Japan it occurs chiefly after the periodic rains. In Sumatra there appear to be two seasons of high incidence, June and August, and November to January. It is probably conveyed in Japan by some insect, a small red mite; possibly by a tick in Sumatra. The site of the inoculation is shown as a small red spot, followed by necrosis of the skin and marked inflammation of the nearest lymphatic glands; in fact the presence ot the glands is often of great help in finding the site of inoculation. The necrotic ulcer may be from 2 mm. to 7 mm. in diameter; it is not irritable but shows little tendency to heal; other glands in the body may be affected but are less marked than the primary ones. The second characteristic is an eruption, which appears about the second to third day and is at its maximum from the sixth to the eighth. It is a roseola, slightly raised, confluent all over the body but most marked on the trunk and flanks, and less on the face and limbs; it lasts 8–10 days, turns brownish and slowly disappears. Sometimes the rash is very slight, occasionally it is haemorrhagic and followed by distinct desquamation. The fever resembles that of typhoid with its variations; usually there is a gradual rise of temperature followed by a continued type of fever; occasionally a rapid rise and termination by crisis is found.

The nervous symptoms are very like those of typhoid but in severe cases they generally continue after the fall of the temperature. Diarrhoea is rare, pulmonary complications are not uncommon, and albuminuria is generally present. The blood shows an increase in the white cells, particularly the lymphocytes, and the eosinophiles are diminished. Towards the end of the disease rheumatoid pains are complained of affecting the small articulations; convalescence is protracted. The serum reactions with Eberth's bacillus and paratyphoid A and B are always negative, neither has any organism been found in the blood or in the primary lesion. The author has not been able to infect monkeys with injections of the blood of cases nor to demonstrate whether the disease is due to a filtrable virus, nor has he been able to find any specific pathological changes in the organs after death. Four plates are given showing the appearance of the primary lesion and of the larval forms of the carriers.

P. W. B.-S.

WEIR (H. H.). **A Continued Fever of Korea.** [Paper read before a recent Conference of the China Medical Missionary Association]. 9 pp.

In an analysis of his fever cases during the last two years in Korea the author notes that fifteen were of a peculiar type, which for want of a better name he calls para-typhus. They occur in the spring and early summer months, more than half being in May.

The onset may be associated with shivering and headache, the fever is high and the temperature runs a continued course terminating by lysis in the third week. Two charts are given. A well marked rash was present in the first week, varying in character, in some cases very like that of typhoid only generally more abundant and scattered over chest and abdomen; occasionally the spots were deep in colour and in two cases the eruption was very like that of typhus. There was no diarrhoea and pulmonary complications were frequent, though the author states that the râles characteristic of typhoid were not heard. Nervous symptoms were fairly marked; the patients lay on their backs and took little interest in anything around them, not remembering what happened (a toxaemic state); low delirium occurred in two cases. The spleen was rarely enlarged enough to be palpated. The disease differed from typhoid in its shorter course, and absence of abdominal symptoms and splenic enlargement; from typhus in its very low mortality and infectivity, general mildness and the termination by lysis.

[There is a reference to the disease known as "para-typhus" in Japan, but the author does not appear to be conversant with it. He does not mention in his cases the occurrence of ulcers of the skin or enlarged glands (as described by SCHUEFFNER above) nor does he appear to have made any attempt at clearing up the etiology by laboratory methods. These will be of interest in future communications as evidently we are dealing with a distinct disease.]

P. W. B.-S.

Bruch (A.). Une Nouvelle Observation de Fièvre Boutonneuse de Tunisie.—*Arch. Inst. Pasteur de Tunis.* 1914. Aug. 1. Vol. 9. No. 1. pp. 43.

A fresh case of this interesting fever is noted. The disease was originally described by the late Dr. A. Conor and the author under the name of Fièvre Boutonneuse or macular fever; other cases have been observed by Gabbi in Tripoli, and Balfour at Khartoum. In the present instance, a woman aged 56 living at Tunis was affected. She complained of fever, pains in the limbs and back, and had diarrhoea for one day. The eruption commenced to appear on the second to third day; at first discrete it became generalised and at the end of a week it was characteristic and had extended all over the body and lower part of the face; the palm of the right hand was affected but neither the left hand nor soles of the feet showed any sign. The tongue was coated, thirst was marked, urine scanty, stools normal, and the general condition was good. The patient stated that she had suffered much from mosquitoes, which came from a collection of water outside the window.

P. W. B.-S.

Fonseca (Manuel A.). La Fiebre Roja de Caracas. [The Red Fever of Caracas].—*Gaceta Med. de Caracas.* 1915. Jan. 31. Vol. 22. No. 2. pp. 9-16. With 11 charts.

An account of 13 cases of an eruptive fever which the author met with in the course of his practice at Caracas. It resembled dengue in having a two-peaked temperature curve and a scarlatiniform eruption which came out in two stages like that of dengue. Points of difference were the absence of any joint affections, and a tendency to suppression of urine in the early stages giving rise to a suspicion of yellow fever. Dengue has been already reported as occurring in Venezuela by Perez Fontado in a paper which appeared in *Gaceta Medica de Caracas,* No. 7, 1908, but the author finds that his cases correspond more perfectly to those described by Deeks and Perry from the Panama Canal Zone [see this *Bulletin,* Vol. 1, p. 244.]

J. B. Nias.

Fretz (W. L.). Fevers in Peshawar.—*Jl. R. Army Med. Corps.* 1914. Nov. Vol. 23. No. 5. pp. 518–521.

The fevers most frequently met with at Peshawar are, as in most other Indian cantonments, sand fly or three day fever, and malaria. With regard to the former no fresh experimental evidence was obtained, but the author notes that an eosinophilia was almost always present and that the disease caused a prolonged period of ill health. For prevention the use of formalin sprays in the bungalows gave unsatisfactory results; lime wash, to which formalin had been added, applied to the walls was more successful but was expensive.

Nineteen cases of malaria were treated with injections of amylopsin, but the results were not so satisfactory as those described by Major

Lambelle [see this *Bulletin,* Vol. 3, p. 148.] The injections gave rise to considerable local and general reaction and had little or no effect upon malignant or chronic cases; of the nineteen treated twelve had relapses. The experiences of Captain Blake at Cherat were similar, four out of five cases having relapses and the fifth having returned to the use of quinine. The author however states that possibly his method of administration of the drug may have been faulty and further experience may give better results.

P. W. B.-S.

PAPPATACI FEVER.

Gabbi (Umberto). **Sul Modo come Avvenne la Comparsa e la Diffusione della "Febbre di Tre Giorni" nella Sicilia Orientale e nella Calabria Inferiore.** [The Advent and Spread of Three Day Fever in Eastern Sicily and Lower Calabria].—*Pathologica.* 1915. Feb. 1. Vol. 7. No. 150. pp. 51–55; & *Malaria e Malat. d. Paesi Caldi.* 1915. Jan.-Feb. Vol. 6. No. 1. pp. 21–26.

The author, who has devoted much time to the study of the fevers endemic in Southern Italy and Sicily, and has carefully examined the local epidemiological characters of three-day or pappataci fever, again brings his views very energetically forward. Apparently the first marked epidemic of the fever occurred at Messina in 1909, when it was looked upon as a peculiar form of summer influenza. In 1910 there was another severe epidemic from June to September, affecting about six thousand of the civil population and one thousand military. In the summer of 1911 the fever again appeared and spread to Calabria. The disease is known to be widely distributed in the Mediterranean area, particularly in the coast towns of the Adriatic and is always associated with the presence of pappataci flies. It has been shown that these flies can be carried alive for long distances, as from Malta to London and from Mostar to Vienna. The coasting mercantile and fishing fleets undoubtedly carry the infected insects from place to place and when conditions are favourable for their breeding epidemics are frequently started, as has occurred at Barcelona and other towns. One of the most important local factors in Italy and Sicily has been the severe earthquakes that have occurred, providing in the ruined walls favourable breeding places. The author notes that there has been a very great diminuation in the annual epidemics, from 6,000 cases in 1910 to a few hundred in 1914, and during this time the old walls in which the pappataci live have been greatly reduced in numbers. He believes that if the epidemics are to be prevented the Government must free the country from the ruined buildings resulting from the earthquakes and provide well built houses and proper sanitary requirements; measures should also be taken to prevent the importation of infected flies from endemic areas to those which are at present free. Another point on which he lays much stress is the financial aspect, for he computes that in the area of the earthquakes with a probable 50,000 persons attacked (Messina, as has been shown, alone had 6–7,000) the loss to the country would be one to one and a half million pounds, for though the fever is short the debility continues for weeks and incapacitates the affected, causing in many places industries to be partially stopped.

P. W. B.-S.

Gabbi (U.). **Resultati di un Inchiesta sulla Febbre dei Tre Giorni nella Calabria Inf. e nella Sicilia Orientale.** [Result of an Enquiry into Three Day Fever in Lower Calabria and Eastern Sicily.]— *Lavori d. Soc. Italiana di Patologia Esotica.* 1914. p. 40.

Professor Gabbi while investigating the prevalence and economical factors of kala azar in Southern Italy and Sicily, distributed a number of questions relating to the fever known as "three day fever" or pappataci fever. Twenty-two questions are asked, and when the answers have been collated they will afford much definite information of the true characters of the fever in that locality.

P. W. B.-S.

PELLEGRINO (Paolo Lombardo). **Su la Febbre da Pappataci o Febbre dei Tre Giorni. Definizione, Etiologia, Patogenesi, Profilassi.**—*Lavori d. Soc. Italiana di Patologia Esotica.* 1914. pp. 21–33.

The importance of this fever is very considerable for, though it is not a fatal one, yet it undoubtedly produces a prolonged period of incapacity for work amongst many of those affected, and thus becomes a social question of importance. The rapid diffusibility of the virus and the large numbers attacked in a locality make measures to check its spread rather urgent. The author has provided a very complete account of the history, distribution, etiology, and prophylaxis of the disease. He fully recognises the work done by English as well as Continental authors and summarises the whole in eleven conclusions which are too long to give here. It will, however, be noted that he prefers the name pappataci fever to three day fever—this separates it from dengue which is "una febbre da culex"—that ambulant forms are difficult to recognise and are efficient sources of infection, and that for prevention the destruction of the phlebotomus flies and their breeding places must be energetically carried out.

P. W. B.-S.

SPAGNOLIO (Giuseppe). **Sintomatologia—Diagnosi—Prognosi e Cura della Febbre dei Tre Giorni.**—*Lavori d. Soc. Italiana di Patologia Esotica.* 1914. pp. 33–39.

The author gives a very full clinical description of the known characters of three day fever, "a fever associated with increased frequency of pulse and respiration with pains in the neck, body, and joints." The nervous symptoms are very marked and the depression of general powers continues long after the fever has passed. As a complication nephritis of short duration is sometimes found. Several varieties of the disease are mentioned, apyretic, abortive and prolonged (four or more days). The differential diagnosis generally rests between malaria, influenza, dengue, and thermic fevers. After the paper there was a discussion in which Professor GABBI and others took part, referring to the nomenclature used and the part played by the phlebotomus flies in the distribution of the disease.

P. W. B.-S.

ZANNINI (William). **Sopra un Epidemia della Cosi Detta Febbre dei Tre Giorni in Comune di Leno (Brescia).** [An Epidemic of so-called Three Day Fever in the Commune of Leno].—*Gaz. d. Osp. e. d. Clin.* 1914. Dec. 17. Vol. 35. No. 135. pp. 2087–2088.

The occurrence of three day fever in an epidemic form has frequently been described from Southern Italy and the adjacent coasts of Sicily.

The author here draws attention to a true epidemic of the disease in the province of Leno (Brescia) which lasted from July to the middle of September. Over 70 cases were noted, but there were probably many more. The disease attacked all classes, but the country and labouring people between the ages of 15 and 45 suffered most. Generally the cases were isolated, but as many as six in a family were known to have been affected. The disease ran a mild course, but as usual it was followed by a more or less prolonged period of debility; for treatment salicylate of quinine was most commonly used. The clinical characters are rather fully discussed, but did not differ from those which are generally known. The author insists upon the importance of destroying the flies and their breeding places, old walls, etc., if this troublesome disease is to be prevented.

P. W. B.-S.

WALKER (W. O.). **A Note on the Influence of Atmospheric Temperature on Sandfly Fever.**—*Indian Med. Gaz.* 1915. Feb. Vol. 50. No. 2. p. 60. With 1 chart.

After demonstrating that the incubation period of sand fly fever in Chitral is from three to five days, the author shows, by means of a chart giving the maximum shade temperature and the daily incidence of cases, that with the rapid rise of temperature in May there was an influx of cases and that any fall in the temperature was followed five days later by a fall in the number of cases until the end of June, when nearly all the non-immunes had contracted the disease. After that date though the temperature still remained very high the number of cases was small. The high atmospheric temperature is not the cause of the disease, but it influences its production. The author also states that the resulting debility increased the severity of an epidemic of typhoid which followed.

P. W. B.-S.

BOLT (R. A.). **Sandflies (Phlebotomus) in China and their Relation to Disease.** [Paper read before a recent Conference of the China Medical Missionary Association]. 10 pp.

From his experience in Pekin the author draws attention to the commonness of sandflies and febrile reactions due to these in Northern China. May and June are the worst months and the flies are most abundant near old crumbling buildings. The natives of the part appear to be immune, but all others suffer from these pests, particularly the young children. Febrile attacks of three days are common, followed sometimes by prostration for a week or more. The author by means of a form which he sends out endeavoured to map the distribution of the sandflies in China and from the returns he gathers that they do not occur in Southern China, are rare along the Yangtze, and reach the maximum prevalence in a line from Tientsin and Pekin to Shanhaikwan (40th parallel). The species of Phlebotomus present is yet undetermined, but specimens have been sent to Professor NEWSTEAD for identification.

P. W. B.-S.

SERGENT (Edm.). **Première Note sur les Phlébotomes Algériens.**—*Bull. Soc. Path. Exot.* 1914. Nov. Vol. 7. No. 8–9. pp. 660–662.

During the last ten years *Phlebotomus papatasii* has been noted in Algeria, being widely distributed in the Mediterranean ports, in the oasis of the desert, and on the high plateaus. In 1904 the author showed that these flies were agents in spreading the Biskra boil and perhaps various fevers, as phlebotomus fever, dengue and three or seven day fever. He here states that these beliefs so far rest on no secure laboratory foundation, and much more work is required to settle definitely the etiology of these diseases in Algeria. The species and distribution in Algeria as at present known are :—

P. papatasii in all the coast towns, most commonly in July, August, and September.

P. papatasii, *P. minutus* var. *africanus*, and *P. perniciosus* found on the high plateaus (800–1,000 m.) only in the first three weeks of September.

At Beni-ounif-de-Figuig during October the *P. papatasii* are very troublesome, and *P. minutus* is very rarely seen. At Biskra, *P. papatasii* and *P. minutus* are about equally abundant in the hot summer–autumn months, but *P. perniciosus* is very rare.

P. W. B.-S.

OROYA FEVER AND VERRUGA PERUVIANA.

STRONG (R. P.), TYZZER (E. R.) & SELLARDS (A. W.). **Oroya Fever. Second Report.**—*Jl. Amer. Assoc.* 1915. March 6. Vol. 64. No. 10. pp. 806–808.

In the first report the etiological characters of this fever were discussed aud its relationship with Verruga particularly referred to, the definite opinion being stated that the two diseases were quite distinct. In this paper the seasonal prevalence and clinical manifestation of Oroya fever or Carrion's disease are studied. The distribution is not limited to the Oroya valley; it probably extends to many other valleys of the Peruvian Andes. The disease is most prevalent from January to April though cases occur in other months, but no very definite conclusions can be drawn at present. In the description of the clinical features there is very little new information; the incubation period is, however, stated to be about twenty days. In published accounts undoubtedly other diseases have frequently been described as Oroya fever, particularly para-typhoid infections. The blood changes, which are very intense, are described fairly fully, the extreme anaemia and presence of the intra-corpuscular bodies known as *Bartonella bacilliformis* being the most important. The mortality is probably from 30 to 40% though some observers place it much higher, 75%.

P. W. B.-S.

STRONG (R. P.) & TYZZER (E. E.). **Pathology of Oroya Fever. Third Report.**—*Jl. Amer. Med. Assoc.* 1915. Mar. Vol. 64. No. 12. pp. 965–968.

This very interesting account of original work helps to place the etiology of the much misunderstood Oroya fever on a firm scientific basis. In previous literature very little reliable information on the pathology is to be found, the monograph of ODRIOZOLA (1898) being the most important. In this he draws attention to the condition of anaemia, and congestion of the lungs, liver, spleen, lymph and mesenteric glands. The authors drew most of their deductions from material collected by themselves, but they also examined specimens from the Dos de Mayo hospital of Lima.

The gross pathological changes were, anaemia with small haemorrhages and oedema, marked emaciation, congestion or oedema of the lungs, spleen usually enlarged and containing infarcts, liver large and flabby with mottled areas of necrosis, mesenteric and lymphatic glands swollen and pink in colour; in the large intestine there were occasionally superficial ulcers, and the bone marrow had a soft grey appearance.

The histological changes were particularly interesting. The liver cells, especially round the hepatic veins showed fatty and hyaline changes, forming areas of toxic degeneration producing tissue necrosis; pigment in small quantities was present which did not react for iron. In the spleen infarcts were common and in the infarct area, which is much congested, leucocytes could be shown migrating into the necrotic tissue; the veins contained thrombi, indicating injury to the endothelium by some toxic substance. Pigment in large or small granules, but unlike that of malaria, was present as well as large endothelial cells containing rounded or rod-shaped bodies. In the bone marrow there were marked evidences of phagocytosis by the endothelial elements of both the red and white cells. " The extensive phagocytosis found in the liver, spleen and bone marrow indicates the presence of a toxic substance which has led to chemical changes or injury of the engulfed cells." In the lymph glands the most striking pathological changes, as seen also in the spleen, were the large swollen endothelial cells, attached or free in the blood vessels; many were distended with round or rod-shaped bodies (*Bartonella bacilliformis*) and it is probable that the multiplication phase takes place within these cells; these are best seen in fresh smear specimens stained with Giemsa. Sometimes the cells contain few of these bodies, at others they may be distended with rounded masses or spheres, each having a definite number (not stated) of minute points of chromatin. Similar distended endothelial cells were seen in the blood vessels of the mucosa and in the lymphoid tissue of the ulcerated large bowel, the affected cells sometimes obstructing the lumen of the vessel.

From a study of the cells it would appear that the spheres break up into a large number of minute elements each containing a chromatin granule; these elongate and finally appear as distinct rods containing a granule of chromatin at one end; when the sphere is ruptured and the bodies are set free, the rods are most apparent. These are identical with the bodies seen in the red cells in the peripheral blood. The appearances in the endothelial cells of the lymph glands in Oroya fever are very like those pictured by GONDER in the life cycle of *Lymphohaematocytozoon parvum* (*Theileria parvum*). From these observations the authors think that *Bartonella bacilliformis* should be classed as a protozoon related to the above mentioned organism. They were able to demonstrate similiar pathological characters in some of the Mayo hospital specimens. They also show how errors are not infrequently made by mistaking cases of tuberculosis for verruga and Oroya fever, though of course the two may possibly coexist.

[The wording in the paragraph on the relationship of verruga and Oroya fever to tuberculosis is badly put, and unfortunately the paper is unaccompanied by any plates or diagrams; these no doubt will soon be published.]

P. W. B.-S.

STRONG (R. P.) & TYZZER (E. E.). **Experiments relating to the Virus of Verruga Peruviana. Fourth Report.**—*Jl. Amer. Med. Assoc.* 1915. Apr. 3. Vol. 64. No. 14. pp. 1124–1127.

In previous publications the authors have reported that they were unable to transmit the parasite of Oroya fever into animals either by subcutaneous, intravenous, or by intra-testicular inoculations, but that the virus of verruga could be passed on. In the present paper they give the result of their further experiments bearing on the transmission of verruga, to determine if the disease was directly inoculable, if a visible micro-organism was present, if it was a spirochaete, and lastly to differentiate the disease from framboesia and syphilis. They found that the monkey was the most susceptible animal but that a certain amount of success was obtained with both dogs and rabbits. In monkeys subcutaneous inoculations gave rise to local sores, never to generalised infections. They were able to transmit the virus through twelve successive series and they have had positive results in twenty-five monkeys. The virus however becomes gradually attenuated and failures were not infrequent. In the dog subcutaneous inoculations were occasionally successful and the lesion when produced was more vascular than when found in the rabbit's testicle. By intra-testicular inoculations in rabbits and dogs a characteristic lesion was sometimes produced after an incubation period of 10–22 days; by sub-inoculations the virus becomes attenuated.

The authors were able to confirm COLE's finding that the histological structure of the nodules produced in monkeys was similar to those found in man. Experiments to cultivate the virus by the method described by NOGUCHI were not successful though suggestions of growth were obtained, from which on the sixteenth day of the culture. a number of papules were produced in a monkey after 21 days' incubation; these did not mature showing that the virus though still living was in an attenuated form. The results of inoculation of filtrates from verruga nodules were not conclusive when made from human or animal sources. The failures might be due to the virus being too small in quantity or too attenuated in character to produce lesions in animals having a relatively low susceptibility.

No definite micro-organism could be demonstrated by any method and the authors consider it not unlikely that the virus will prove to be a filtrable one. There seems to be some analogy between the virus of verruga and that of small pox: both can be locally inoculated and give rise to localised lesions; both produce a specific immunity after inoculation. Neither the virus of small pox nor verruga have been cultivated in vitro in artificial media and from both, chlamydozoa-like bodies have been reported.

P. W. B.-S.

ODRIOZOLA (E.). **Enfermedad de Carrion.** [Carrion's Disease].—*Cronica Med.* [*Lima.*] 1914. May. Vol. 31. No. 610. pp. 147–152.

A clinical lecture on a case of Carrion's disease. The patient, a boy of 14 years of age, had only suffered from the symptoms for a few days before entering the hospital, having previously enjoyed good health. The illness began with fever, vomiting and great prostration with increasing anaemia. The number of red corpuscles per cubic millimeter had fallen to 1,800,000 in the course of nine days. A single button of the characteristic type was in course of development on the left instep, leaving no doubt as to the diagnosis. Some remarks on the clinical features of this mysterious disease conclude the paper.

J. B. Nias.

MISCELLANEOUS.

Breinl (A.) & Priestley (H.). Observations on the Blood Conditions of Children of European Descent residing in Tropical Australia.—*Ann. Trop. Med. & Parasit.* 1914. Dec. 15. Vol. 8. No. 3. pp. 591–608. With 3 charts.

The authors point out that tropical anaemia, that is anaemia due to climatic influences after prolonged residence in the tropics, was, up to recently, a generally accepted condition; in many cases it was probably not differentiated from a secondary anaemia brought about by parasitic invasion. An account is given of the investigations on this subject from 1889 to those of Chamberlain in the Philippines, which concerned 702 soldiers resident there about 20 months. It is pointed out that the conclusions, with one exception, are based upon a comparatively small number of blood counts and haemoglobin estimations, and Chamberlain's averages were obtained from persons who had resided in the tropics for a short time only.

"Opportunity was therefore taken to make observations on similar lines in Townsville. In tropical Queensland a second and, to a limited extent, a third generation of children is growing up at the present time. A sufficiently large number of blood counts and haemoglobin estimations on children of ages between 7 and 15 years who had been residing in Townsville during the whole or most of their life would, in our opinion, furnish more convincing evidence on the influence of a tropical climate, as prevailing in the coastal belt of North Queensland, upon the blood conditions of a transplanted European race. Sufficient time would have elapsed for any alteration due to climatic influence only to become established."

An account is given of the technique. The children examined were between the ages of 7 and 16. Boys and girls are considered separately and the averages are set down for each age. One of several tables is reproduced.

Table 6.—Comparison of the average number of erythrocytes and haemoglobin value of 305 schoolboys and 269 schoolgirls of Townsville.

Average erythrocyte count.	Average number of leucocytes.	Haemoglobin.		
		Average absolute content.	Average percentage.	Average colour index.
Boys, 5,046,100	10,868	12·31	89%	0·88
Girls, 5,107,700	9,077	12·66	92%	0·90
5,076,900	10,036	12·485	90·5	0·89

The enquiry extended over a period of 12 months. A comparison of the figures obtained in the dry and wet season respectively shows that the climatic conditions, as such, had no pronounced influence upon the number of red blood corpuscles in the peripheral circulation.

The following are the conclusions of this valuable paper:—

"Careful blood examinations were performed on 574 school children in Townsville, of European descent, of ages between 7 and 15, of whom the majority had been born and had resided in tropical Queensland during their whole life.

"The results indicate:—

"1. That the average number of red blood corpuscles is not diminished when compared with analogous figures for children born and bred in a temperate climate.

"2. That the average haemoglobin content of the blood is normal.

"3. That the number of leucocytes is slightly increased.

"4. That the average blood pressure does not show any difference from that of normal children in temperate climes."

A. G. B.

Breinl (A.) & Priestley (H.). Changes in the Neutrophile Blood Picture of Arneth observed in Children living in Tropical Queensland.—*Ann. Trop. Med. & Parasit.* 1914. Dec. 15. Vol. 8. No. 3. pp. 565–574. With 1 chart.

Chamberlain and Vedder in their investigations on the effects of a tropical climate on white men made 72 Arneth counts on American soldiers and 50 on Filipinos. They were led to the conclusion that "the average Arneth picture showed a marked shift to the left in the case of Filipinos and a slight drift in the same direction for Americans resident more than one year in the Philippines."

Table 3.

	Arneth Classification per cent.					Index Arneth
	I	II	III	IV	V	
Average for 72 healthy Americans in Philippine Islands	13·3	32·9	37·2	14·6	2	46·2
Average for 50 Filipinos ..	27·5	38·3	25·8	7·5	0·9	65·8

In Breinl & Priestley's experiments—

"Two nuclear fragments, connected by a thread only, were counted separately, whilst they were counted as one when connected by a distinct bridge. In case of uncertainty regarding the class to which a cell belonged, the higher class was chosen. Only perfectly prepared films were used, and in each case 200 successive cells were enumerated. Each 100 was counted separately, and when the figures were consistent the count was accepted." The films were stained by Giemsa.

Arneth and differential counts were performed on the blood of 150 unselected children of ages between 7 and 15 and are tabulated according to the ages. The averages given in the table indicate that the Arneth index of normal healthy children who have resided in tropical Queensland for the whole or most of their life is very high indeed, compared with the average figure of children living in a temperate climate; in other words it shows a well-marked shift to the left. The results of the authors and of the Philippine observers are represented graphically in a chart. The Arneth index of North Queensland children is seen to resemble closely that of Filipinos.

In the authors' opinion "the Arneth picture is an expression of the functional activity of the leucopoietic system, especially the bone marrow, rather than that of phagocytic activity. The presence of a large number of neutrophile leucocytes belonging to Class I indicates a greater activity of the bone marrow but does not necessarily imply that the resistance of the organism is lowered in any way." In their experience the North Queensland children show no greater susceptibility to infectious diseases than the same class in Europe.

In the differential leucocyte counts 500 successive leucocytes were enumerated. The average number of ploymorphonuclears is somewhat lower than in Europe. This is in accordance with the findings of CHAMBERLAIN and VEDDER, who obtained an average of 56·1 per cent. for the polymorphonuclears of American soldiers in the Philippines. The average of eosinophiles is distinctly increased, from 2 to 4 per cent. in Europe to 7·7 per cent. Children suffering from helminthic infections were as far as possible excluded. The average differential counts were as follows :—

Polymorphonuclears	56·1
Transitionary	4·2
Large mononuclears	2·4
Lymphocytes	29·5
Eosinophiles	7·7
Mast cells	0·04

Average total number of leucocytes 10,751.

The conclusions are as follows :—

"1. The number of polymorphonuclear neutrophile leucocytes in the blood of the children living in tropical Queensland is distinctly decreased, the number of eosinophile leucocytes markedly increased.

"2. The Arneth count performed on 150 school children living in tropical Queensland shows a marked shift to the left, the Arneth index being 74·5 as compared for normal individuals (Arneth) in Europe.

"3. The 'shift to the left' in the Arneth blood picture is, in our opinion, due to the effect of a tropical climate upon the white race living in the tropics."

[As the text-books do not seem to describe Arneth's index an account of it is given.]

"A classification of polymorphonuclear neutrophiles based on the number of nuclei or nuclear fragments was proposed by Arneth in 1904. He described five main classes. Class I has a single nucleus which may be round or of irregular shape. . . . Class II includes the neutrophiles with two nuclei or nuclear fragments. Class III has three nuclei or fragments and is the largest class in normal blood. Classes IV and V have respectively four and five nuclei or nuclear fragments. A fairly constant proportion between the different classes is found in normal blood. The "neutrophilic blood picture" as given by Arneth is for each 100 polymorphonuclear leucocytes as follows :—

Class I	Class II	Class III	Class IV	Class V	Index (Arneth).	Index (Bushnell and Treuholtz).
5	35	41	17	2	40·0	60·5

"Simon gives the following normal range for each 100 neutrophiles :—

Class I	Class II	Class III	Class IV	Class V
4–9	21–47	33–48	9–23	2–4

"The so-called nuclear fragments seldom if ever represent separate nuclei, but only lobes of a polymorphous nucleus, the connecting nuclear substance being drawn out into a fine thread. The "index" is a standard for comparison of different pictures. Arneth adopted as an "index" the sum of classes I and II while Bushnell and Treuholtz selected the sum of classes I and II and one-half of class III.

"The polymorphonuclear leucocyte is the active phagocytic cell of the blood stream and the corpuscles with three or four nuclear fragments are considered the adults and are thought to be most active as phagocytes and best fitted to protect the body against invading organisms. The superannuated cells represented by class V and the immature cells represented by classes I and II are less able to take up the defence of the body. . . .

"When the first and second classes are increased above normal and the third and fourth are correspondingly decreased the condition is spoken of as a "shift or a drift to the left" while the reverse alteration is called a "shift to the right." . . . Arneth considers a shift to the left an evidence of lowered resistance to the disease affecting the patient whose blood he is studying, as is indicated by the fact that when a tubercular patient improves the blood picture tends to return to the normal."*

A. G. B.

BREINL (Anton). **The Distribution and Spread of Diseases in the East. Protozoa and Disease. The Influence of Climate, Disease, and Surroundings on the White Race Living in the Tropics. (Being the Stewart Lectures of the University of Melbourne, 1913).**—31 pp. With 31 figs. 1914. Melbourne: By Authority: McCarron, Bird & Co.

The author writes that "the preservation of Tropical Australia can only be accomplished by means of the study and the eradication of tropical diseases present, by the prevention of the introduction of new diseases, and by the study of the influence of climatic and economic conditions upon the white settler in Northern Australia, with a view to eliminating any influences which might lead towards the deterioration of the race." This indicates the scope of the three lectures, which were probably delivered before a lay audience. The first contains data of interest to readers of this *Bulletin*.

Malaria. The distribution of malaria in Australia corresponds on the whole with that of the mosquito *Nyssorhynchus annulipes*, which acts as the carrier.

Dengue was introduced into Queensland in 1894 or probably earlier, and now and again reappears.

Undulant fever has hitherto not been recorded.

Dysentery. Bacillary dysentery is responsible for a large number of deaths among the natives of New Guinea and is the most important disease in that island from the economic point of view. It has been introduced into Thursday Island (Torres Straits) by labourers recruited from New Guinea.

Sprue is confined to the coastal belt of Queensland between Mackay and Cairns.

Leprosy is met with in New Guinea; it is comparatively rare in Australia.

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*CHAMBERLAIN (W. P.) & VEDDER (E. B.). A Study of Arneth's Nuclear Classification of the Neutrophiles in Healthy Adult Males and the Influence thereon of Race, Complexion, and Tropical Residence.—*Philippine Jl. Sci.*, Sect. B, Trop. Med., 1911. Vol. 6, pp. 405–407.

Beriberi has been observed among the native labourers in New Guinea and numerous cases have originated among the coloured crews of the pearling boats in Thursday Island.

Yaws prevails in the Torres Straits Islands and among the aborigines of the Northern Territory. In New Guinea the disease is rampant.

Filariasis is irregularly distributed in Queensland; it is more prevalent in Brisbane and Port Douglas than in Townsville. In Brisbane nearly 17 per cent. of admissions to hospital show the parasite in their blood.

Gangosa is endemic in British New Guinea, and has been found in the Torres Straits Islands.

Juxta-articular nodules were described from New Guinea by Sir William MACGREGOR.

Ankylostomiasis is frequent in North Queensland; both *A. duodenale* and *N. americanus* are frequently encountered. The American hookworm is more common in New Guinea. The disease has not been found in the Australian mines.

Stegomyia fasciata is very frequent in Darwin and is found as far south as Brisbane. The temperature in Northern Australia during the summer months is high enough to enable the yellow fever parasite successfully to undergo its development in the mosquito. A thorough and energetic campaign against *S. fasciata* is recommended.

In the third lecture Breinl calls attention to comparative measurements of the violet and ultra violet rays of the solar spectrum by means of the photocatalytic decomposition of oxalic acid in the presence of uranyl acetate (FREER), made at Townsville and Brisbane, and to a few observations on the blood of school children made by PRIESTLEY and himself, and concludes that our knowledge of the influence of climate *per se* is very limited. Finally he states that by reason of the diversity of climates and practical absence of native population Tropical Australia offers far more favourable conditions than any other tropical country for permanent white settlement.

A. G. B.

CALDERON (Fernando). **Some Data concerning the Medical Geography of the Philippines.**—*Philippine Jl. Sci.* Sect. B. Trop. Med. 1914. June. Vol. 9. No. 3. pp. 199–218.

A description is given of previous writings on this subject, the first of which was published in 1857. The following is an account of some of the diseases which have an important influence upon the mortality of the Philippine Islands. The author expresses acknowledgments to the Director of Health, Dr. V. G. HEISER.

Beriberi causes approximately 5,000 deaths per annum. There is much evidence to show that beriberi in mothers affects the nutritive value of their milk; this is believed to be one of the causes of 'taon' among children. It is noted that three times as many breast-fed infants die as bottle-fed infants. In Government institutions the substitution of unpolished for white rice has caused the deaths from this disease to fall from an average 600 per annum to nil. In Cebu Island, where corn is the staple article of diet, there is practically no beriberi and taon is exceedingly rare.

Malarial fever is responsible for at least 25,000 deaths per annum. There are now 700 agencies for the distribution of quinine.

Smallpox has been much reduced by systematic vaccination. Glycerinated vaccine has been found to be of doubtful value after it has been removed from an icebox for longer than ten days. Recently a powdered vaccine has been prepared, which it is hoped will keep longer.

Leprosy causes at least 1,000 deaths per annum, and probably as many new infections. The lepers are now segregated at Culion and new cases of the disease have been reduced in number. It is noted that, whereas Cebu Island has approximately one-tenth of the population of the Philippines, it has furnished over one half the lepers that have been collected.

Amoebic and *bacillary dysentery* still prevail to a very large extent. On Catanduanes Island, which is noted for its poor water, there were several hundred deaths in 1912 from bacillary dysentery, whilst in towns where there is good artesian water bacillary dysentery is becoming less and less common.

Filariasis varied in its incidence in the different islands; among prisoners from Leyte 35 per cent. were infected (*Filaria nocturna*), from Bataan 3 per cent., other islands being intermediate.

Tuberculosis is believed to cause 40,000 deaths annually. An Anti-tuberculosis Society was organised in 1910. The author thinks that a more active campaign is necessary.

He concludes that if modern knowledge which is already available could be successfully applied, 100,000 deaths in the Philippine Islands could be prevented annually.

The author sent certain questions to a large number of physicians located in the islands and received answers from 95, tabulated at the end of the paper. These show that the three diseases which predominate in the whole archipelago are pulmonary tuberculosis, malaria, and dysentery, whilst next come beriberi, the intestinal parasites, gastro-enteritis, bronchitis and broncho-pneumonia.

A. G. B.

VADON. Un Poste Médical Consulair en Chine, Yunnan-Fou.—*Ann. d'Hyg. et de Méd. Colon.* 1914. Apr.-May-June. Vol. 17. No. 2. pp. 501–525. With 1 plate.

In this paper an account is given of the hospital work carried on by the author in conjunction with Dr. BUI-BAN-QUY. Yunnan-Fou lies at an altitude of over 6,000 feet on the 27th degree of North latitude; the province adjoins Burma. Its population is about 100,000. It is situated in the middle of a great plain. The population lives in a state of promiscuity and dirt without the slightest idea of public or private hygiene, so that one would expect to see severe epidemics. Such however are unknown; in four years' stay the author has not seen a single case of plague or cholera, though Yunnan has been described by several authors as an endemic focus of plague. Typhoid fever and bacillary dysentery, if they exist, are very rare, though the wells contain much organic matter. It is noted however that the Chinese take almost all their liquid in the form of tea. There is a certain amount of small-pox. In 1912 739 people were vaccinated with lymph from Tonkin with excellent results. *Malaria* is found, but it is very rare and the cases are light. Four or five years ago the land round the town was under rice and mosquitoes abounded ; now the rice has given place to dry cultivation. Anopheles are rare, chiefly *A. maculipennis*. Of the three species of parasite, *P. vivax* has been met with most frequently, but *P. malariae* and more rarely *P. falciparum* have also been observed. No case of remittent fever or haemoglobinuria has been observed.

Leprosy is fairly frequent. Nerve leprosy occurs in the proportion of 60 per cent., mixed leprosy of 25 per cent., and tubercular leprosy of 15 per cent. The Chinese attribute the disease to the ingestion of fowls' eggs. Fowls, they say, themselves suffer from leprosy. This legend was investigated by the author and proved to be without foundation. *Tuberculosis* is relatively rare, the pulmonary form surprisingly so, althôugh the very numerous inhabitants live crowded in narrow dark lanes where light rarely penetrates. It is possible that a number of children succumb to unrecognised phthisis. Tuberculosis of the skin, glands and bones is very common and usually mild. The severe lesions of tertiary *syphilis*, such as sclerosis, gummata, visceral lesions and cerebral lesions are very rare, and tabes and general paralysis are unknown. The hereditary form of the disease is frequent. The author uses two intravenous injections of salvarsan at three weeks' interval, the first 40 cgm., the second 20 cgm. *Goitre* is extremely common ; it is attributed by the Chinese to the use of rock salt. Statistics of the patients treated follow.

A. G. B.

Collin (L.). i. **Aperçus Démographiques sur les Îles de la Loyauté.**—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 600–604.

ii. **Hygiène des Indigène des Îles de la Loyauté.**—*Ibid.* pp. 598–600.

i. According to the author's own observations and the views of the principal native chiefs the inhabitants of two at least of the Loyalty Islands are steadily decreasing in numbers. Two causes are given: the departure of men to New Caledonia to become artisans, labourers, or servants, and sterility. The numbers of the sexes in various villages are given to show the disproportionate number of women. The proportion of childless households was noted in eleven villages ; in eight it was over 20 per cent. and in one it reached 50 per cent. The figure for France is given as 14 to 16 per cent. In an endeavour to ascertain the cause 24 households were examined. There was found a complete absence of hygiene in the women, uterine affections with purulent discharges in 17, chronic gonorrhoea as a rule in the men, and old orchitis in several instances. Tuberculosis is noted as common and this and gonorrhoea are believed to be the chief causes of the progressive depopulation. High infantile mortality is also noted.

ii. A vivid account is given of the insanitary conditions in which these natives live.

A. G. B.

Remlinger (P.). **Les Populations Nomades du Maroc au Point de Vue de la Propagation des Maladies Infectieuses.**—*Paris Méd.* 1914. Aug. 1. Vol. 4. No. 35. pp. 234–235.

The author, who is Director of the Morocco Pasteur Institute, writes that there are few epidemiological factors in that country as important as the movements of the nomad tribes. He distinguishes three types of nomadism—small, medium and great, the last of which is very important. The small type of nomadism is that which takes place within the territorial limits of the tribe. Several tribes move their tents frequently in the course of the year in the search for pasture. This sort of nomadism will become less as the country advances. The extreme degree of nomadism is represented in Morocco by the migration of the Draouat who inhabit the valley of the Oued Dra to the south. Many of these are agricultural labourers and therefore the chief movement takes place at the time of harvest, but it goes on all the year. The Draouat leave their country in small bodies, not recognising the authority of any chief. Each travels at his own expense and leaves his companions when he finds work. The men do not bring tents or mats and carry very little luggage. A large part of Morocco is said to be furrowed from north to south throughout the year by the Draouat caravans.

The chief diseases which they spread are plague, typhus, smallpox and granular conjunctivitis. Various outbreaks of plague since 1909 have been traced to them. With regard to smallpox, vaccination is unknown, and as regards typhus, seeing that they only leave their clothes when their clothes leave them, they are sure refuges for pediculi. In all the coast towns epidemics of smallpox and typhus coincide with the arrival of the Draouat. It is pointed out that they would play an equally important part in the propagation of cholera.

As regards the measures which can be taken the author suggests the establishment at some distance from every town of an observation post. These would be large, walled sites where tents could be erected; here the nomads could pass the night, get a bath and have their clothes disinfected. They would be kept there a day or two before entering the town and they would be vaccinated. Supervision at their point of departure is at present impracticable.

A. G. B.

Ruediger (E. H.). **The Germicidal Power of Glycerin on Various Micro-Organisms under Various Conditions.**—*Philippine Jl. Sci.* Sect. B. Trop. Med. 1914. Nov. Vol. 9. No. 6. pp. 465–477.

The author writes that though glycerin is extensively used, especially as a preservative in vaccine virus, little has been published regarding its germicidal properties. He therefore made tests to find out to what extent glycerin may be relied on to sterilize bacterial vaccines. The germicidal power was tested on the typhoid bacillus, *Staphylococcus albus*, *S. aureus*, and the bacilli of anthrax, plague, cholera, diphtheria and glanders, the glycerin being diluted with physiological salt solution at room temperature and at 15° C., with bouillon at room temperature, and with horse serum at room temperature in the several experiments.

In another experiment four strains of plague bacilli were tested comparatively. The results are set forth in tables.

The conclusions are as follows :—

"Glycerin has a distinct although feeble germicidal action.

"The germicidal action varies greatly with the temperature, being much feebler at a temperature of 15° C. than at from 30° to 35° C.

"The germicidal action varies with the diluent employed ; in glycerin diluted with physiologic salt solution the micro-organisms died much sooner than in glycerin diluted with bouillon or with horse serum.

"In dilutions up to 50 per cent., glycerin did not destroy the bacillus of anthrax in fifteen days. This may be due to the presence of spores.

"Glycerin seems to be a selective poison for the bacillus of plague, the spirillum of cholera, and the bacillus of diphtheria.

"In 50 per cent. of glycerin in physiologic salt solution all the nonsporeforming organisms died in less than four days.

A. G. B.

CROWELL (B. C.). **The Chief Intestinal Lesions encountered in One Thousand Consecutive Autopsies in Manila.**—*Philippine Jl. Sci.* 1914. Sept. Sec. B. Trop. Med. Vol. 9. No. 5. pp. 453–460.

The author's summary and conclusions are as follows :—

"In a series of 1,000 consecutive autopsies in Manila, performed during eighteen months, aside from the incidence of intestinal parasites and tumours and the lesions in bubonic plague, intestinal lesions have been encountered in 292 cases. In this series Asiatic cholera (on account of an epidemic occurring during this period) stood first numerically. Second in importance was intestinal tuberculosis, and attention has been drawn to the possibility of the occurrence of dysenteric symptoms in this condition and to the perforation of intestinal ulcers in three cases. Typhoid fever was present more frequently than either entamoebic or bacillary colitis, and these typhoid cases showed a high percentage of perforations (30 per cent.) and haemorrhages (12 per cent.), all of the cases being among Orientals. Entamoebic and bacillary colitis have been encountered with less frequency than the preceding diseases, and have presented many of the possible complications and sequelae. Liver abscesses occurred in 29 per cent. of the entamoebic cases, and in 2 cases the intestines had perforated. Bacillary colitis was present more frequently in children than in adults. Nine cases of duodenal ulcers were encountered, 6 of which had perforated, and 15 cases of peptic ulcer of the stomach occurred in the same series. Severe anaemia and symptoms referable to the gall bladder were prominent in some of the cases of duodenal ulcer. Unclassified, probably nonspecific inflammatory lesions of the intestines, especially in infants, occupy an important place, and offer a promising field for further etiological study."

The cases were derived from a large hospital, a hospital for contagious diseases and the medico-legal services of the city of Manila. The overwhelming majority were Filipinos. Bubonic plague and Asiatic cholera furnished 149 of the cases. The incidence of the diseases was as follows :—

Asiatic cholera	92
Intestinal tuberculosis	56
Typhoid fever	39
Entamoebic colitis	31
Bacillary colitis	25
Duodenal ulcer	9
Noninfectious or unclassified inflammatory lesions of intestines	57

In 17 cases two or more of the above lesions were coexistent in the same case.

It is noted that during the fiscal year 1913 tuberculosis was responsible for 17·9 per cent. of the deaths of the residents of the city of Manila. Of the 56 cases the tuberculosis was generalised in 35, in three there was a perforation by a tuberculous ulcer, and the remainder died from intercurrent diseases. The author writes it would seem important to remember that an extensive tuberculous colitis can closely simulate an entamoebic colitis. Of the 31 cases of entamoebic colitis 9 died of liver abscess, 5 of acute peritonitis, 3 of toxaemia, and the rest from intercurrent diseases. Of the 25 cases of bacillary colitis 14 occurred in children under seven years of age. In 12 of the cases there was involvement of the lower portion of the ileum. Broncho-pneumonia is stated to have been present in from one third to one half of the cases.

Of the unclassified cases 35 occurred in infants and 22 in adults. The cases in children were not cholera nor were they of the type of bacillary colitis. The majority of the infants were extremely emaciated and many had broncho-pneumonia ; diseases of the skin were frequent. The author is doubtful whether to account for these cases " by poor or injudicious feeding, by actual, exogenous infection, or by the action of the normal flora of the intestine under unfavourable conditions."

A. G. B.

Butler (C. S.). **The Application of Wassermann's Reaction to the Solution of the Etiology of Tropical Ulcerations.**—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal. Saigon* (1913). 1914. pp. 395–405.

The author, who is a surgeon in the U.S. Navy and writes from the Philippines, notes that in the classification of tropical ulcerations there is considerable confusion, due largely to the fact that it is upon an etiological basis. Two or more causes frequently operate in the same body—tuberculosis and syphilis, syphilis and leishmaniasis, etc.

He proceeds to criticise the inadequate methods used to determine the causes of these ulcerations. The clinical appearance, for example, is very deceptive, as may be the examination of the stained and fresh exudate. In cases of tropical phagedaena and the so-called gangosa, unless we unmask the underlying dyscrasia " we may search in vain the ulcer exudate, and section to no purpose the tissue of which the ulcer is composed." The examination of scrapings or tissue sections often gives valuable information, revealing for instance acid-fast organisms or leishmania.

He proceeds to discuss the Wassermann reaction and its results. He performed the test as done by Emery on 647 natives of the Philippines. Of 200 lepers 44·5 per cent. were positive; of 373 natives whose symptoms warranted a suspicion of syphilis 48 per cent. were positive; of 74 prisoners in the tuberculosis ward, taken without selection, 21 per cent. were positive. Of the total 647 natives 44 per cent. were positive. He notes that the percentage of positive reactions among lepers was just a little smaller than among the classes suspected upon clinical evidence of having syphilis. He is almost convinced that the difference between 21·6 in the average lower class population and 44·5 per cent. among the lepers represents the difference in the amount of syphilisation of the two classes.

He has clinical and laboratory notes upon thirty cases of ulceration of the skin, in which tuberculosis, leprosy, sporotrichosis, actinomycosis and dermal leishmaniasis could be excluded from the diagnosis. Some were representative of gangosa; in all the diagnosis of tropical ulcer could be made. Of 27 ulcers in which there is record of the result of the Wassermann reaction 26, or 96 per cent. gave positive results. He has no hesitation in saying that in each case the native was suffering from syphilis. He notes that there is abundant clinical evidence to back up the Wassermann figures. He remarks that there is very little syphilis of the nervous system in Cavite Province and very few primary lesions are seen. He thinks the natives do not apply for treatment until they get mutilating ulcers.

In the remainder of the paper gangosa in Guam and the Philippines is discussed. He notes that the process may, and often does, affect any part of the skin and manifests a preference for those parts which are attacked by syphilis. Some of the arguments used for gangosa's being a new disease do not convince him. As regards the alleged absence of syphilis, the people came in contact with Europe and Mexico in 1521, and have been liable to infection ever since. The statement that the lesions are not curable by anti-syphilitic remedies is a mistake, as has been shown by ODELL.*

He thinks there can be little doubt that gangosa is syphilis. He quotes a letter from Surgeon C. P. KINDLEBERGER, in charge of the U.S. Naval Hospital at Guam, who states that "gangosa is now believed by us to be a tertiary manifestation of untreated yaws, possibly combined with an element of hereditary syphilis." The conclusions are as follows:—

"1. Syphilis and framboesia constitute a serious problem in public health in the tropics. They are the chief causes of the mutilating ulcerations of Guam and the Philippines.

"2. The Wassermann reaction is of incomparable importance in tropical medicine.

"3. Gangosa in Guam and the Philippines comes in the class of complement-absorbing diseases and is on this basis comparable to tabes dorsalis and general paresis."

[This writer appears to base the diagnosis of syphilis in lepers upon a positive Wassermann, though there are indications that he has doubts. The generally accepted opinion is that in leprosy a positive Wassermann can often be obtained quite apart from syphilis. CLEGG found that 11 of 24 lepers responded to the Wassermann test, but none gave the luetin reaction. If Dr. Butler believes that so large a proportion of his lepers are syphilitic he must, if he wishes to carry conviction, furnish other evidence, such as the finding of the treponema.]

EGGERS (H. E.). i. On the Spirochaetal Infection of Ulcers in China. —*China Med. Jl.* 1914. Nov. Vol. 28. No. 6. pp. 365–371. ii. *Jl. Infect. Dis.* 1915. Mar. Vol. 16. No. 2. pp. 269–284. With 13 text-figs, 1 chart and 1 map.

i. The author, who writes from the Laboratory of Pathology and Bacteriology, Harvard Medical School of China, Shanghai, has by means of the organisation of the China Medical Missionary Association examined smears from unselected cases of ulcers of the extremities sent to him from all parts of China. They were fixed at the laboratory in methyl alcohol and stained with Giemsa. Clinical data were few The following conclusions were reached :—

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* *U.S. Naval Med. Bull.*, 1911, Vol. 5, p. 430.

> "1. Some six different morphological types of spirochaetes have been found in leg ulcers from China.
>
> "Of these, one [Type A] is known to be associated with a disease of fairly distinct clinical features. The pathogenic significance of the others is more doubtful, but one or two of them are quite possibly disease producers.
>
> "2. No constant relationship could be shown between the spirochaetes and fusiform bacilli, but apparently both may occur independently of each other.
>
> "3. Spirochaetes of the morphological type of those associated with tropical ulcer have been found in all degrees of abundance in smears from ulcers. When present in small numbers, the lesion apparently presents no distinctive clinical features.
>
> "4. As regards geographical distribution, the north, as nearly as may be judged from a ver ylimited amount of material, seems to be free from spirochaetal infections. They appear to be particularly frequent in central China, and less frequent, though present, in southern China. The same remark holds even to a greater degree, of the distribution of tropical ulcer. Hence this term, at least as applied to China, appears to be something of a misnomer."

Of the 1,500 specimens examined 115, or 7·6 per cent., showed spirochaetes. The commonest type (type A), found in 92 specimens, was a "long, very tenuous organism" about 13 microns in length with three to four regular convolutions of considerable amplitude. "Typical tropical ulcer is usually associated with large numbers of organisms of Type A." Another type, found in 49 cases, resembled the last but was usually irregularly and finely convoluted, about seven microns long; its pathogenicity is considered less probable. Three types of bacilli, two fusiform, were seen. The spirochaetes were very rare in some specimens, very abundant in others. Most of the smears came from the Yangtse valley.

ii. An expanded form of the same paper. There are six photomicrographs of the spirochaetes found, chiefly type A; photographs showing the lesions of tropical ulcer of the feet; a chart showing the seasonal incidence; a table of the geographical distribution of "spirochaete infected ulcers"; and a map on which various data are indicated. It is noted that some evidence of increased frequency of spirochaetal infections was observed during the summer months, and that tropical ulcer appears to be most frequent in the early and late summer.

A. G. B.

Smits (J. C. J. C.). II. Klinische waarnemingen omtrent het ulcus tropicum. [With English Epitome.] [Clinical Observations on Ulcus tropicum].—*Geneesk. Tijdschr. v. Nederl.-Ind.* 1914. Vol. 54. No. 6. pp. 674–717. With 1 plate and 1 chart.

The author, who is in charge of the Central Hospital of the Sennah Rubber Company, Limited, Bila, Sumatra, bases his paper on the study of 241 cases. In his experience the chief cause of the disease is labour in the thin mud of the plantations. It is most prevalent in the months of largest rainfall, as is shown by a chart. Proof has not been furnished that the virus is able to penetrate the sound skin; it enters either by a pre-existing wound or together with something which causes a lesion. The symbiosis of VINCENT was found in all cases, the bacilli at the surface, the spirochaetes more deeply. Ulcus tropicum is most frequent on the lower extremities and next on the upper, but by infecting pre-existing wounds it is possible to produce the ulcer at any point of the body. It is noted that the hard skin of the sole and palm is always untouched. The ulcers at the borders of the toes were the most progressive and resistant to treatment. Syphilis and yaws frequently coexist with ulcus tropicum. If the case is treated in hospital prognosis is favourable. In uncomplicated cases hydrogen peroxide proved of great use; in such cases neither thermocautery nor sharp spoon are called for. For some complicated cases a saturated solution of picric acid is recommended. Many ulcers which defy surgical treatment are favourably influenced by salvarsan, even when syphilis or yaws are absent; this opinion is based on 50 cases.

A. G. B.

CHAMBERLAIN (Weston P.). **Spirochaetae and Fusiform Bacilli in Various Lesions in the Philippines.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1914. Oct. Vol. 2. No. 4. pp. 246–255. With 1 plate.

The author states that the fusiform bacilli associated with spirochaetes have been demonstrated in the following conditions:—Noma, ulcerative stomatitis, diphtheria, carious teeth, hospital gangrene, appendicitis, brain abscess, foetid bronchitis, gangrene of the lung, pyorrhoea alveolaris, syphilitic lesions of the mouth and fauces, ulcers of the skin, caries in the nose, lobar pneumonia, septic hand-infection and in apparently normal mouths and tonsils. These organisms, referred to as Vincent's, have been studied for the last ten years, but there is still much doubt as to their nature and action. Some believe that the bacilli and spirochaetes are different forms of a single micro-organism. Most investigators have been able to isolate only fusiform bacilli in cultures. Some think the organisms are protozoa.

During two years in Manila the author examined 106 patients with various lesions in the mouth and throat, with a view to determine the presence of fusiform bacilli and spirochaetes in smears from the exudates. In 53 per cent. of these cases the organisms were present in greater or less numbers, most commonly in lesions of the tonsils and the gums. Nearly all the patients showing the organisms were young adult males. From the literature and investigations of his own he thinks that these organisms are likely to be present in lesions of the mouth and fauces more frequently in the Philippines than in temperate climates. He notes that the spirochaetes come out clearly when stained with ordinary dyes, but do not take the colour at all with sulphuric-acid-methylene-blue, as used for demonstrating the tubercle bacillus; they are likely therefore to be missed.

He has once met with this association in ulcers of the skin. Such findings have been recorded by many observers in different parts of the tropics but do not seem to be common in the Philippines. The author states that the role played by spirochaetes and fusiform bacilli in these ulcers has not yet been worked out. In a discussion which followed, Dr. S. B. Wolbach said that he had found spirochaetes and fusiform bacilli in phagedenic ulcers in the Gambia and had succeeded in staining them in sections of tissues in four cases in which they were deep in the tissues. He was inclined to think that these organisms had an etiological significance.

[M. Blanchard appears to have demonstrated that phagedenic tropical ulceration can be transmitted directly from man to man [see this *Bulletin*, Vol. 4, p. 36.]

A. G. B.

Whyte (G. Duncan). **Splenomegaly: being a Report on a Hundred and Four Cases met with in South China.**—*Ann. Trop. Med. & Parasit.* 1915. Jan. 29. Vol. 8. No. 4. pp. 659–674. With 3 charts.

The author first gives a list of the causes of splenomegaly, which is defined as chronic and very great enlargement of the spleen. In these cases, observed in the hospital at Swatow, polycythaemia and leukaemic conditions could be excluded by the blood counts, leaving malaria, kala azar, splenic anaemia (Banti's disease), and possibly histoplasmosis and Egyptian splenomegaly (Day and Ferguson‘ to be considered. Clinically it was "impossible to differentiate any one of the Swatow cases from Banti's disease." The history and symptoms of the cases are then considered with a view to their differentiation from malarial cachexia, Banti's disease and kala azar. For kala azar the description given by Rogers in "Fevers in the Tropics" is followed. In half the cases the disease came on between sixteen and twenty-five; 88 per cent. remembered having had fever. Haemorrhage was recorded in 61 per cent., diarrhoea in 50 per cent. The average length of the spleen, measured on the abdomen, was 23 cm. Apparently after six years it diminished.

With regard to the blood, leucopenia is present in all three diseases. The ratio of red cells to white cells in these cases was not that found in kala azar, according to Rogers, and the prognosis is quite different, 28 per cent. of Whyte's cases having lasted ten or more years.

Table VIII.—Showing the results of blood examination in various cases of enlarged spleen.

	Cases of Kala-azar.		Other Splenomegalies.	
Country	India	North China	South China	Egypt
Observer	Rogers	Cochran	Whyte	Day and Ferguson
No. of Cases	80	12	104	40
Erythrocytes.. ..	2½–4 million.	2,304,000	3,600,000	2,635,440
Leucocytes	700–2000	2,360	2,650	4,503
Ratio of white to red cells	Less than 1 : 1,500	1 : 1,200	1 : 1,713	1 : 585
Polymorphonuclears..	—	47·5%	56%	62·8%
Polymorphonuclears per cmm.	Less than 2,000	1,121	1,486	2,828
Mononuclears, including lymphocytes ..	60%–80%	50%	39%	28·8%

In the Egyptian cases marked ascites was almost constant; in Whyte's series it was infrequent.

Histoplasma capsulatum has not been found in the peripheral blood of Swatow patients, but the spleen and liver have never been punctured. [Histoplasma was found in the tissues post mortem by DARLING.]

The conclusions are as follows:—

"1. That, in spite of a careful consideration of the symptoms and an examination of the blood, it is impossible to say whether the Swatow patients were suffering from malarial cachexia, histoplasmosis, or some hitherto undescribed condition.

"2. That one or more cases of splenic anaemia may have been included in the 104 Swatow splenomegalies, because the clinical differentiation of these two conditions is impossible.

"3. That if the cases which have been described are malarial cachexia, then some of the signs which have been found useful in India in differentiating malarial cachexia from kala-azar—e.g., the ratio of the leucocytes to the haemocytes—do not apply to patients in South China.

"4. That 'experience is fallacious and judgment difficult.'"

A. G. B.

MAXWELL (James L.). **Tropical Febrile Splenomegaly and its Surgical Treatment.**—14 pp. With 1 chart. [Paper read before a recent Conference of the China Medical Missionary Association.]

The author, who writes from Tainan, Formosa, states that this disease is common in the south of the island, so much so that it would be impossible to judge of the incidence of malaria by the splenic index. The patients are generally young to middle-aged men, workers in the fields and very poor. The disease appears to commence with fever, and patients are usually found to have fever when they come to hospital. The chief clinical signs are the great enlargement of spleen and liver. The legs are usually slightly oedematous. Epistaxis is common, haematemesis rare; dysenteric symptoms are relatively common. In advanced cases ascites occurs. No details are given of the blood picture, except that there is usually leucopenia. The author states that these are not cases of chronic malarial spleen, which yields well to treatment, nor are they cases of kala azar, which has not been found in Formosa.

The surgical procedure for the disease is splenectomy, which is advised for the following classes—Cases of splenomegaly with marked enlargement of the liver and leucopenia, or at least relative reduction of polymorphonuclear leucocytes; cases of splenomegaly with early ascites and a similar blood picture. In the pre-ascitic stage it holds out good hope of a permanent cure. The rest of the paper is concerned with the details of the operation. The conclusions are as follows:—

"1. There is a disease met with in Formosa, China. Egypt, and other places, characterised by progressive enlargement of the spleen accompanied by fever, and separate, though distinguished only with difficulty, from other diseases causing splenomegaly in the Tropics. For want of a better name we propose at present to retain that of febrile tropical splenomegaly.

"2. The disease commences with enlargement of the spleen which is soon followed by enlargement of the liver. In the early stages it may possibly be amenable to medical treatment. It is certainly curable by splenectomy.

"3. Finally in a certain proportion, possibly all the cases, it passes on to contraction of the liver with ascites. The prognosis after operation at this stage is very doubtful, but without operation, and in cases beyond the reach of operation, it is always fatal.

"4. The operation of splenectomy, if careful attention be paid to detail, is not very dangerous in suitable cases and the result if successful is well worth the risk run.

"5. There is urgent need for systematic investigation into the diagnosis, prognosis, and etiology of this disease."

WHYTE's paper is referred to in an appendix. His cases "probably include only a few" of those referred to here as he finds that "terminal ascites is comparatively rare."

A. G. B.

DEADERICK (William H.). **The Differentiation of the Diseases associated with Splenomegaly.**—*Southern Med. Jl.* 1915. Mar. Vol. 8. No. 3. pp. 211-214.

The author discusses the clinical differentiation of the diseases met with in the Southern States in which there is marked enlargement of the spleen. These are, chronic malaria and malarial cachexia, distinguished by the author; splenic anaemia; leukaemia; Hodgkin's disease; pernicious anaemia (rarely); cirrhosis of the liver; syphilis; and others. In his experience splenomegaly is rarer in the negro than in the white race.

A. G. B.

EAST AFRICA PROTECTORATE. i. **Nairobi Laboratory Report (Bacteriological Section). For the Months January-June, 1913.** Vol. 4. Pt. 1. By Philip H. Ross [Govt. Bacteriologist.]—19 pp. 1914. Nairobi: Printed by the Government Printer.

ii. **Nairobi Laboratory Report (Bacteriological Section). For the Months July-December. 1913.** Vol. 4. Pt. 2. By J. H. Harvey PIRIE [Acting Govt. Bacteriologist].—17 pp.

i. In the period under review 1,863 examinations were made in the Nairobi Laboratory. Half of these were blood smears, many of which showed evidence of malaria (parasites in 123 cases, 113 subtertian). There were 27 positive Widal reactions. Of positive examinations for plague there were 23 in man, 28 in rats. *Bacillus leprae* was found once. The meningococcus was found in 88 specimens of cerebro-spinal fluid. A table shows that cases of human plague occurred in Nairobi in January, February, March, April and June, 14 in all, and that infected rats were found in the same months. The number of rats was insufficient for the author to decide whether rat plague is present all the year round or occurs only in epizootics. With regard to small-pox an increased demand for lymph dried *in vacuo* is noted; unfortunately its preparation takes much time. Experiments to determine the animal reactions of the trypanosome conveyed by *G. longipennis** are detailed. Attempts to transmit it by this species from infected to clean monkeys appeared to fail, but it is noted that the temperatures of the latter were often suspicious. The Report closes with meteorological tables for the six months.

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* See this *Bulletin,* Vol. 1, p. 505.

ii. Dr. Harvey PIRIE, the writer of this Report, relieved Dr. Ross on November 6th, so that he was in charge for only seven weeks. 3,726 examinations were made in the six months, an increase mainly accounted for by the large number of rats brought to the laboratory. Material from six cases of human plague was received, two from Nairobi, the rest from elsewhere. Of 2,682 rats examined six only were infected, all in July and August. An examination of the Nairobi drinking water was commenced. The tap water gave on MacConkey's medium 8 organisms per cc., two of which corresponded very closely with typical *B. coli*. The introduction of a filter bed below the reservoir or at the tanks is suggested. There were issued from the laboratory 166,200 doses of vaccine, 3,240 in dried form (Achalme-Phisalix method), the rest glycerinated.

A. G. B.

BAERMANN (G.). **Behandlungsversuche mit Salvarsankupfer. (Frambösie, Malaria, Amöben-Dysenterie, Lepra).** [Experimental Treatment with Salvarsan Copper.]—*München. Med. Woch.* 1914. Jan. 6. Vol. 61. No. 1. pp. 1–5. With 2 figs.

This substance was sent by EHRLICH to the author in Sumatra for trial in amoebic dysentery. It is a complex compound prepared by EHRLICH and KARRER. KARRER'S investigations showed that the copper is united with the arsenic group and not with the amidophenol. It is a yellowish-red fine powder which is kept in closed ampoules under neutral glass. It is dissolved in double normal soda solution, and is always used intravenously. It can be given three times at intervals of two days; the maximum dose the author found to be 0·15 gm. The drug was used in 45 cases. An account of these is given. The conclusions were to this effect:—

K_8, as the product is called for convenience, acts powerfully in yaws (22 cases); according to the impression of the author even more powerfully than salvarsan. The spirochaetes disappear in 24, or at the most 48 hours. Even the severest manifestations heal, as is shown by a figure, extremely quickly. In 9 cases out of 13 the Wassermann reaction was changed from positive to negative by a single injection of 0·1 gm. In the single case of quartan malaria the treatment was curative. In four cases of tertian there has hitherto (two months) been no relapse; in another case with very numerous parasites there was a relapse, or possibly reinfection. In two cases of pernicious fever in which there were only small rings and no gametes, the patient had remained free from parasites for two months; five cases of pernicious malaria which showed young gametes and crescent were not influenced. In two cases of amoebic dysentery K_8 was found to be quite without action. In one case of mixed leprosy there was an undoubted influence on the nodules, ulcerations and general condition.

The author states that these results have only a problematical value, but show that the remedy has great chemotherapeutical power. Further investigations will find the suitable doses. Experiments were to be repeated on a larger scale.

A. G. B.

LANGERON (Maurice). **Rémarques sur l'Emploi du Peroxyde de Benzol en Hématologie Coloniale.**—*C. R. Soc. Biol.* 1914. Mar. 27. Vol. 76. No. 11. pp. 502–503.

As a rule it is very difficult to stain with Romanowsky old blood smears, especially those which have been made in the tropics and sent to Europe. With the lapse of months the red cells become more and more basophile, the parasites stain very badly and their nuclei are difficult to demonstrate. The author has tried peroxide of benzol (lucidol), introduced by SZECSI, to rejuvenate smears of malarial blood collected in Tunis in 1911 and smears of horse blood containing *T. cazalboui*, made by JOYEUX in West Africa in 1908. The result was very good. The subsequently stained malarial parasites showed clearly the characters of their protoplasm and nucleus; the granules of the parasited red cells still stained with difficulty. The trypanosomes, which were almost unstainable, showed clearly the nucleus and blepharoplast. Peroxide of benzol is found in commerce in the form of a fine white powder insoluble in water; it is an energetic oxidiser. The author uses it dissolved in 10 per cent. acetone. The smears to be fixed, which must be quite dry, are left in it from 10 to 15 minutes in a well-corked receptacle; they are then washed several times in a mixture of three parts acetone and two parts toluene, to get rid of the crystals of peroxide of benzol which form. The preparations are then passed into pure methyl alcohol and stained by Pappenheim's method: one minute in a mixture of equal parts of May-Grünewald solution and distilled water and 15 to 20 minutes in Giemsa, three drops in 2 cc. distilled water. The solution of peroxide of benzol in acetone must be thrown away as soon as it forms crystals

A. G. B.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

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PLAGUE.

Kunhardt (J. C.), Taylor (J.), assisted by **Ganpati Iyer (R.), Kesava Menon (T.), Varadhachari (B. V.), Raghavendra Rao (R.) & Narayan Rao (K.)**. **Epidemiological Observations in Madras Presidency.**—*Jl. of Hyg.* Plague Supplement IV. 1915. Jan 1. pp. 683–751. With 7 maps and 30 charts.

This investigation was undertaken by the Indian Plague Commission with the view of finding a solution to the question why the Madras Presidency had, relatively to many other parts of India, only been slightly affected with plague. A previous investigation into conditions in Madras City had shown that the relative scarcity of rats and rat fleas there was not sufficient to account for the immunity of the city, and it appeared probable that the explanation was that the infection had difficulty in reaching the city.

So far as the incidence of plague is concerned, the Presidency may be divided into three zones:—(1) The Bellary district, the Mysore Plateau and the Nilgiri Hills, which have all suffered severely from plague; (2) a zone lying immediately below and around these areas, which has suffered but lightly from plague; and (3) the East Coast and Southern portion of the Presidency, which have escaped the ravages of the disease.

Laboratories were established by the Commission in each of these zones, Denkanikota being selected as representing the Mysore Plateau and the conditions favourable to endemic plague; Coimbatore and Vaniambada were chosen for observations below the Mysore Plateau, while the town of Madura and the earlier observations in Madras City represented the Southern Districts and East Coast respectively, that had all but escaped plague.

The climatic conditions in zone (1) were found to be highly favourable to the spread of plague. Observations taken at Bangalore in the Mysore Plateau, for example, show that except for two months in the year the mean temperature is below 80° F. and during the cold weather below 70° F. The relative humidity for the greater part of the year is above 70 per cent. and from June to September it is above 80 per cent. From the observations made at Denkanikota it appeared that the flea prevalence in the district was high, varying from 14·9 fleas per rat in August to 3·1 fleas per rat in May. The maximum number of fleas was co-related with the greatest number of plague cases. The number of rats caught, per 100 traps set, varied from 27·5 in August, 1911, when trapping observations were started, to 2·6 in August, 1912, when the operations were discontinued.

The climatic conditions of zone (2).—Coimbatore may be taken as an example of the climatic conditions met with in this zone. The hot weather is very short and the temperature is never very high, while the relative humidity is high throughout the year. The climatic conditions are not unfavourable to the spread of plague infection once the disease has found a foot-hold in the district, infection, when it occurs, usually being derived from the Nilgiris.

The average number of fleas per rat varies from 1·4 in May to 10·4 in September, the height of epidemic plague in the district being reached in August and September. In Vaniambada the flea prevalence attained its maximum about the beginning of January when, approximately, 10 fleas per rat were recorded, the temperature and relative humidity at the time being respectively 72·7° F. and 81·6 per cent. The numbers of rats trapped varied from 14·4 in November to 2·6 in February.

The climatic conditions in zone (3).—As stated, the climate of the town of Madura is representative of the conditions met with in the south of the Presidency. The climate is very hot and dry, the lowest mean daily temperature being 77·7° F. and the temperature is below 80° F. for only seven weeks of the year. The number of fleas found per rat was smaller than in any other district examined, varying from 6·8 per rat in March to 3·5 in April, but the numbers of rats trapped were large, varying from 49·6 per 100 traps in May to 19·9 in July.

It cannot be said that the number of rats and fleas in any of these localities was, in the light of the Commission's experience elsewhere, too small to prevent the development of an epidemic in them. Experiments conducted by the Commission (*Jl. of Hygiene,* Plague Supplement 2, pp. 229–265) have shown that rats caught in certain towns in the Presidency, which have been practically free from plague, are very susceptible to the disease, but that rats caught at Bellary, a town in the Presidency that has suffered severely from plague, are highly immune, thus indicating that conditions exist in the former places which hinder the successful implantation of infection. These conditions are probably to be found in the hot climate obtaining over the greater part of the Presidency. A lowlying hot and dry plain separates the areas at present infected from more humid and cooler coastal regions, especially in the north of the Presidency. Plague has rarely occurred on the East Coast, but on the West Coast the seaport towns of Mangalore and Calicut have suffered from importation of infection from Bombay. The unfavourable conditions in the area mentioned above most probably break the chain of communication between the infected area on the West and the cooler regions on the East coast, as rat fleas when separated from their hosts speedily succumb to the combined effects of a high temperature and drying.

R. St. John Brooks.

Hostalrich. **Un Foyer de Peste Bubonique en Annam.**—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal. Saigon* (1913). 1914. pp. 244–255.

The severe epidemic of bubonic plague which occurred in the province of Binhthuân (Annam) from February to August, 1908, claimed over

2,000 victims among the native population. In the chief town of the province, Phan-thiêt, and in the suburb of Phu-trai, 1,100 cases occurred with a mortality of 850.

The virulence of the epidemic is attributed to the insanitary habits of the natives, living as they do in dark and badly ventilated houses with the floors polluted with the remains of decomposing fish and other rat pabulum, the sick remaining in the closest contact with healthy persons.

In the chief town 578 cases occurred, of which over two-thirds were fatal. The majority of those attacked were females, which is attributed to the fact that the native women live in the contaminated dwelling to a greater extent than the men, and are thus more exposed to infection. Out of a series of 294 cases, 264 were bubonic, 19 septicaemic, three pneumonic, one intestinal, and seven ambulatory. Over 71 per cent. of the bubonic cases and all the other cases, with the exception of the ambulatory forms, died of the disease. It is suggested that the infection in the pneumonic cases was started by inhalation of bacilli from clothing contaminated by the excretions of plague rats, or by infection of the mucous membranes by means of infected flies (Diptera). [The possibility of the first pneumonic case being secondary to plague septicaemia is not considered.]

Five grave cases were treated by blood-letting (300 to 500 grams), intravenous injections of massive doses of Yersin's serum (100 cc.) and by intravenous injection of physiological salt solution (1 litre). Three of these desperate cases recovered.

The view is expressed that for Yersin's serum to have any appreciable effect on the course of the disease the first injection must be given within 48 hours from the appearance of symptoms. R. St. J. B.

KURAOKA (H.). **Epidemiological Study of Plague in Formosa.**—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal. Saigon* (1913). 1914. pp. 204–212.

While admitting that the conveyance of plague from rat to rat is largely effected by rat fleas, the author, from his experiences in Formosa, is strongly of opinion that at least one third of human cases are caused by contact with inorganic matter contaminated with plague bacilli, through the medium of wounds. This conclusion is based on the fact that of 734 persons suffering from plague, 181 were found to have cuts or wounds on their bodies, showing a percentage of 24·66, which are assumed to have contracted plague by some other means than the agency of fleas. [It is not very easy to follow the process of reasoning that led to this conclusion, but apparently the argument is that as the wounds were sometimes situated in the same region as the primary buboes, the infection must have been introduced by such channels.]

The author is also of opinion that plague is carried over the off-season in the bodies of animals suffering from "chronic" [resolving] rat plague, and that plague is often conveyed from rat to man by means of the dejecta from plague rats. [Neither of these contentions are sustained by a scintilla of experimental evidence, and they are in direct opposition to the results of years of elaborate and painstaking experimentation carried out by the Indian Plague Commission.]

R. St. J. B.

FLU (P. C.). **Kleine Mededeelingen [Plague Notes].**—*Geneesk. Tijdschr. v. Nederl. Indie.* 1914. Vol. 54. No. 5. pp 570–580.

This short paper comprises notes on the author's observations on epidemic plague in various parts of Java. He describes an explosive outbreak of pneumonic plague which occurred at Toeloe Sajoe and also an epidemic of bubonic plague at Karanglo in which 185 cases were recorded. The distribution of the buboes in this series is of interest as, among the children attacked, in 65·5 per cent. of the cases the primary buboes were situated in the axillary and cervical regions, as against 22·5 per cent. among adult males and 31·7 among women. An explanation for this may be found in the fact that women and especially children, from the nature of their habits and work, are more likely than men to expose the upper portion of their bodies to the bites of plague infected fleas dwelling on the floor of plague infected houses, or that by reason of the fact that they remain indoors for a greater portion of the day than the men, they are more liable to be bitten on the head and shoulders by infected fleas dropping from the roof.

R. St. J. B.

AKIN (Charles V.). **An Epidemiological Study of a Plague Focus.**—*U. S. Public Health Rep.* 1914. Dec. 25. Vol. 29. No. 52. pp. 3468–3471. With 5 figs.

During the outbreak of plague in New Orleans in 1914 a very interesting plague focus was discovered in premises situated in Magazine Street. These premises occupied a very large lot and were in the shape of a great double L (⊔) encircling on three sides an interior court and surrounded on all sides by a brick wall running to the full height of the two stories. Infected rats having been found on the premises, it was marked down for fumigation and rat proofing. During the course of these operations it was observed that at first only *Mus norvegicus* were seen. When the *Mus norvegicus* population had been finally disposed of, *Mus rattus* began to make its appearance and readily became plague infected from the fleas that had survived the death of the ground rats. Infection of the mouse population of the building followed that of *Mus rattus*, as *Mus musculus* dwelt in closer relation to *Mus rattus*, on the second floor of the building, than it had done with the *norvegicus* population, which had mainly inhabited the ground floor. No human cases occurred although people were living over a hotbed of infection. This is explained by the fact that the rat population was so large that human blood did not present any temptation to the rat flea, which apparently did not at any time find any difficulty in procuring a meal from its natural host.

R. St. J. B.

BACOT (A. W.). **Further Notes on the Mechanism of the Transmission of Plague by Fleas.**—*Jl. of Hyg.* Plague Supplement IV. 1915. Jan. 1. pp. 774–776. With 2 plates and 2 text figs.

In this paper the author confirms the previous observations of Bacot and MARTIN with regard to the mechanism of plague transmission by fleas. [This *Bulletin*, Vol. 3, p. 201.] It is pointed out that even when a passage is cleared through the proventriculus of a flea that has become blocked with a plug of plague organisms, the lost valvular action of the organ is not restored, and that ingested blood can flow out of the flea's stomach just as easily as it enters it.

"In this condition the infection of any animal on which the flea fed would seem to be more, rather than less, likely than in the case of a flea in which the proventriculus is completely blocked. With the existence of a patent proventricular valve the infected contents of the stomach may, owing to the peristaltic contraction of that organ, be regurgated into the wound on the cessation of the suction of the pharyngeal pump."

R. St. J. B.

BACOT (A. W.). **Observations on the Length of Time that Fleas (*Ceratophyllus fasciatus*) carrying *Bacillus pestis* in tneir Alimentary Canal are able to survive in the Absence of a Host and retain the Power to re-infect with Plague.**—*Jl. of Hyg.* Plague Supplement IV. 1915. Jan. 1. pp. 770–773.

Collections of 100 to 300 fleas (*Ceratophyllus fasciatus*), after being given opportunities to suck the blood of mice which were in the comatose condition which precedes death from plague septicaomia, were placed in a series of 11 cages, to which healthy mice were added subsequently. In nine of the cages the test mice died of typical pest, but in two cages, Nos. 1 and 8, no infection to test mice occurred within the usual period of three to five days, after which the mice were removed. When the mice, dead or living, had been removed, the cages were covered with waxed cloth, to prevent drying as far as possible, and stored in a cool situation (mean temperature about 45° F.). The cages were then allowed to remain for periods varying from 18 to 73 days without any host for the contained fleas, and when the desired periods had elapsed the waxed cloth covers were removed and two healthy mice were added to each cage. In three of the cages, Nos. 2, 3 and 8, which had been stored for 29, 34 and 47 days respectively, the mice died of pest. The mouse in cage No. 8 did not die until a period of 24 days had elapsed; consequently the period between the original infection of the flea population and the infection of the new host must have been about 67 days. It thus follows that plague infection may persist in fleas for one or two months in the cool weather and, subsequently, give rise to an epizootic.

R. St. J. B.

BACOT (A. W.). **Notes on the Development of *Bacillus pestis* in Bugs (*Cimex lectularius*) and their Power to convey Infection.**—*Jl. of Hyg.* Plague Supplement IV. 1915. Jan. 1. pp. 777–792. With 2 plates and 1 text fig.

Bugs (*Cimex lectularius*) which have become infected by ingesting the blood of septicaemic plague mice are, if they manage to survive the infection, capable of carrying *B. pestis* and reinfecting mice after a period of 48 days. A certain proportion of bugs, however, and probably all newly hatched ones, do not survive the infecting meal and die in a paralysed condition.

The structural character of the ingested blood is preserved for many days in the crop of the bug, and the development of *Bacillus pestis* is slower, and the resulting growth is looser, than is met with in the case of the flea. This taken in conjunction with the fact that there is not any distinct valve between the pump and the crop, precludes the idea of mechanical blockage such as may obtain in flea infection.

One of the difficulties encountered in Bacot's experiments was the eating of the bugs by the mice in the cages. This undesirable state of affairs can be obviated by placing pieces of wood, in which a number of saw-cuts have been made, in the cages. The bugs are thus afforded cover from the attacks of their enemies.

R. St. J. B.

KERANDEL (J.). **Insectivore Réservoir de Virus de la Peste au Cambodge.**—*Bull. Soc. Path. Exot.* 1915. Feb. Vol. 8. No. 2. pp. 54–57.

In this paper is recorded a case of plague infection in a species of long tailed shrew (*Crocidura murina*), the dead body of the animal being found in the neighbourhood of a house in the Chinese quarter of Phnôm-Penh. These animals, which are commonly known among Europeans as "musk rats," are insectivorous in their habits and are frequently found in human habitations, being attracted thither by the insects and larvae furnished by the depôts and reserves of wood. They appear to suffer from a high degree of *Xenopsylla cheopis* infestation, and thus constitute a very real danger in localities infected with plague. The destruction of *Crocidura* ought for these reasons to be recommended in any scheme of anti-plague prophylaxis.

[The Indian "musk rat," *Crocidura coerulea*, is highly resistant to plague, withstanding a subcutaneous dose of one-fifth of an agar tube culture of a virulent strain. The Indian Plague Commission have only noted one case of a "musk rat" which was naturally infected with plague.]

R. St. J. B.

FLU (P. C.). **Muskieten als Overbrengers van Pest?** [Mosquitoes as Carriers of Plague?]—*Geneesk. Tijdschr. v. Nederl. Indië.* 1914. Vol. 54. No. 5. pp. 540–551. With 1 plate.

The author has carried out a series of researches in order to ascertain if under experimental conditions mosquitoes were capable of conveying plague infection. Experimenting with *Mansonia* (sp.?) and *Culex pipiens* it was observed that these insects, when hungry, would freely bite infected marmots, experimentally inoculated with virulent plague cultures. Furthermore it was ascertained that the plague bacilli ingested from the septicaemic blood of these animals multiplied in the stomach of the mosquito and that material obtained from the stomach or fore-gut, on inoculation into healthy marmots, could convey plague infection to them. These inoculation experiments were repeated daily and it was found that infective material could be recovered from the alimentary canal of the mosquito up to the fourth or fifth day after the infecting meal. It appeared desirable to repeat these experiments with different species of mosquitoes, as the Mansonia and Culex used would not bite again and died after the infecting meal, thus prohibiting the crucial experiment—*i.e.* the transmission of the infection by biting. Anopheles and Stegomyia, which are greedy and repeated feeders, would have answered admirably for this purpose, but unfortunately the time of the year in which these experiments were conducted precluded the collection of these insects in sufficient quantities to have given to the results any great significance.

R. St. J. B.

MANAUD (A.). **Observations et Recherches expérimentales sur la Pathologie de la Pneumonie pesteuse.**—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal. Saigon* (1913). 1914. pp. 213–223.

The isolated cases of pneumonic plague which occur in Siam do not appear to have any tendency to cause extension of the disease, and persons coming into intimate contact with such patients do not become infected. Manchurian experience has been very different, for there, pneumonic plague proved to be intensely infective; the bacilli being sprayed about by the patients in the act of coughing, and thus infecting those in the vicinity. It is considered that an explanation of these facts may be that in Manchuria, where the mean temperature is about —20° C., the liquid particles which are coughed out, are immediately frozen and thus acquire a greater penetrating power, while in Siam, where the mean temperature is about +30° C., the minute particles tend to coalesce and are then less likely to be breathed in.

Several experiments were made on guinea-pigs under different conditions of temperature, one series being at —18° C. and another at +30° C. The inoculations were made in the nasal fossa and on the conjunctiva, with drops of emulsions of recent cultures or infected liver. Animals inoculated in the nasal fossa died in from four to five days at the refrigerator temperature and about one day later at the room temperature. In the first series the pulmonary symptoms were the most marked, in the latter series the involvement of the cervical glands. Similar results were obtained with the ocular inoculations.

Typical pneumonic plague was induced in guinea-pigs exposed to aerial infection from frozen pulverized cultures. The results obtained with similar cultures at room temperature varied; in all cases the fatal result was delayed and in a series of three cases involvement of the cervical glands was observed, as in nasal or ocular infection.

R. St. J. B.

ILVENTO (A.) & MAZZITELLI (Michele). **I Casi di Peste curati nell'Ospedale per Malattie Contagiose in Tripoli.** [Plague Cases treated at the Hospital for Contagious Diseases in Tripoli].—*Malaria e Malat. Paesi Caldi.* 1914. July-Aug. Vol. 5. No. 4. pp. 277–296. With a chart.

This communication deals, for the most part, with the clinical history of a series of 55 cases of plague that occurred in Tripoli during a small epidemic in 1913. They were mostly of the bubonic form.

One case was of particular interest, in that the surgeon was accidently inoculated from the contents of a plague bubo and the resulting infection was strictly localized owing to the prompt application of iodine to the seat of injury.

With regard to treatment, anti-plague serum and electrargol did not seem to be of much avail, but injections of iodine in the neighbourhood of the buboes appeared to have some effect in reducing the mortality.

R. St. J. B.

DEGGELLER (O.). **Behandeling van Pestlijders met Intraveneuse Injecties van Formaldehyd-natrium-bisulfurosum.** [Treatment of Plague with Intravenous Injections of Formaldehyde sodium bisulphite.]—*Geneesk. Tijdschr. v. Nederl. Indië.* 1915. Vol. 55. No. 1. pp. 26–34. With a chart.

Following the successful use of Formaldehyde sodium bisulphite (Fonabisit) in cases of pneumonia, puerperal fever and erysipelas, a similar line of treatment has been attempted in the Melang Department of Java in cases of bubonic plague. The complete effect of the drug was unfortunately not obtained, as with delirious patients it was very difficult to inject directly into the vein, the fluid generally escaping into the perivascular tissue, and the effect of the drug was not rapid enough to prevent the fatal termination of the disease.

Three ot the five cases treated with Fonabisit in 5 cc. doses died of plague, while the remaining two cases recovered. One of these cases was a very chronic one, and apparently in a hopeless condition at the time of treatment. The case came under observation on the 27th August, 1914, and received one injection of Fonabisit on the 16th October. The patient improved rapidly and was quite recovered by the 25th of the month. It is admitted that the number of cases treated is too small to allow of any definite conclusions to be drawn with regard to the therapeutic value of the drug in plague. In all cases there was a marked increase in the pulse rate after the injection, usually associated with a subsequent fall in temperature.

R. St. J. B.

ROWLAND (Sydney). **Further Experiments on Vaccination against a Body-Strain of Plague.**—*Jl. of Hyg.* Plague Supplement IV. 1915. Jan. 1. pp. 752–753.

In the preparation of nucleo-protein extracts of plague bacilli, the nearer the conditions in the culture medium used for the propagation of the organisms that are to afford an antigen, approach those that obtain in the body of the living animal, the more the efficiency of the antigen against a body-strain is increased.

The following table shows this increased efficiency of the vaccines used, the test being in every case the same, *i.e.* 3,000,000 virulent organisms from a body-strain of plague :—

Strain.	Cultivated	Inoculated on to agar flooded with	No. of rats inoculated.	Percentage which survived the inoculation
Agar	Serum broth	Heated horse serum	47	57
Agar	Serum broth	Serum spleen extract	39	74
Spleen	Fresh horse serum	Serum spleen extract	41	75
Spleen	Fresh rat serum	Fresh rat serum spleen extract	43	84

R. St. J. B.

Rowland (Sydney). **Immunisation by Pseudotubercle.**—*Jl. of Hyg.* Plague Supplement IV. 1915. Jan. 1. pp. 754–755.

It has already been demonstrated by Rowland that guinea-pigs can be easily protected against a virulent agar strain of plague by means of vaccination with killed cultures of pseudo-tubercle, but the fundamental difference which exists between agar and serum (body) strains of plague is emphasised by the fact that animals so protected do not exhibit any appreciable immunity when tested against serum strains, only 4 animals out of 28 surviving the test dose of such virulent organisms.

R. St. J. B.

Rowland (Sydney). **Immunisation by Living Avirulent Cultures (Strong)**—*Jl. of Hyg.* Plague Supplement IV. 1915. Jan. 1. pp. 756–758.

The Influence of Race on the Efficiency of the Antigen.—*Ibid.* p. 759.

The protection afforded by living avirulent cultures of plague has been the subject of investigation by Strong. Working with such avirulent cultures (Strong), Rowland has demonstrated that they only possess a slight protective value for guinea-pigs and white rats, when tested against a test dose of 3,000,000 virulent plague organisms from a passed culture (Laboratory strain) that killed 90 per cent. of normal rats. Of 20 guinea-pigs protected with a dose of 10,000 of Strong's organisms, 13 died of plague and of 20 rats, 9 died of plague ; a survival percentage of 35 and 52 respectively. When, however, the avirulent organisms used were grown in a medium containing serum broth, a high degree of protection (73 per cent.) was afforded against the same test dose, even although the protecting dose (200 organisms) was reduced to $\frac{1}{50}$ of the original dose. A nucleo-protein extract prepared from these exalted organisms showed that a considerable deterioration of the antigen takes place during the process of extraction and that the protection value of the vaccine was reduced to 40 per cent.

When rats vaccinated with these exalted living virulent cultures were tested against a culture of moderate virulence, which was obtained from one of CASTELLANI's Ceylon cases, only 59 per cent. survived the test inoculation. The degree of immunity conferred was not very striking as 50 per cent. of unprotected controls survived the inoculation with the same test dose. Thus the protection afforded by the Strong antigen against the Castellani strain was not nearly so good as that afforded against the Laboratory strain, notwithstanding the fact that the latter was the more virulent. Furthermore, of 49 rats vaccinated with the Ceylon antigen, 36 per cent. survived the test inoculation with the Laboratory strain, while of 47 rats vaccinated with the Laboratory strain antigen and tested with the same strain, no less than 60 per cent. survived. It is concluded that the two antigens are not entirely identical and that cross immunisation is not complete. It is suggested that such differences in antigens may account for the poor result which has been obtained with Haffkine's prophylactic by certain workers in Java.

R. St. J. B.

ROWLAND (Sydney). **On the Failure to Vaccinate against a Virulent Body-Strain even with an Antigen prepared as far as possible under Body-Conditions.**—*Jl. of Hyg.* Plague Supplement IV. 1915. Jan. 1. pp. 760–761.

A culture of plague derived from a virulent agar strain, on being passed and repassed through the bodies of living rats for a period of about 12 months, exhibited a sudden and unexpected rise in virulence. On the death of the rat the spleen organisms were grown on rat-blood agar and subsequently in serum broth. The resulting organisms were so virulent that a test dose of 3,000,000 bacilli killed 100 per cent. unprotected rats in 48 hours, with evidence of plague infection of extraordinary intensity.

Antigens prepared from this super-virulent strain failed to afford significant protection against the same strain of organisms, 38 out of 44 in one case, and 34 out of 49 in another case, succumbing to infection with the test dose. The author is of opinion that "should a strain corresponding to the one with which the above experiments were made be prevalent in a local epidemic, complete failure of any protective inoculation at present known will occur."

R. St. J. B.

ROWLAND (Sydney). **The Protective and Curative Value, against Infection with a Serum Race of Plague, of the Serum of a Horse immunised with Nucleoprotein extracted from a Strain of Plague Bacilli propagated on Serum Protein.**—*Jl. of Hyg.* Plague Supplement IV. 1915. Jan. 1. pp. 762-764.

It has been observed in Bombay that serum prepared by immunising horses against a toxic nucleo-protein derived from a broth (laboratory) strain of plague, when tried in practice in cases of human pest, completely fails to influence the course of the disease. Nevertheless such serum in 1 cc. subcutaneous doses completely protects a series of rats which have received, subsequent to inoculation, a standard test lethal dose of the same strain of broth organisms, and reduces the mortality from 80 per cent. to 20 per cent. in a series of rats in which a dose of 0·5 cc. of the serum is administered subcutaneously 24 hours after the animals were inoculated with a test lethal dose of the same strain of plague organisms.

Rowland has now shown that a serum can be prepared, using as a source of the immunising toxin a body-strain of organisms and employing the same strain as a test for the efficiency of the serum. The horse used in the experiment received, in all, 1,500 milligrams of nucleo-protein extract, spread over a period of 41 days, and was then bled one litre. 1 cc. of the resulting serum protected 6 rats out of 10 against a test lethal dose of the virulent organisms--100 per cent. of the controls dying from pest. The serum also possessed curative value, in that 1 cc. administered 24 hours after the test lethal dose of the serum race organisms, reduced the mortality from 100 to 30 per cent.

R. St. J. B.

ROWLAND (Sydney). **Ultraviolet Light as a Germicide in the Preparation of Plague Vaccine.**—*Jl. of Hyg.* Plague Supplement IV. 1915. Jan. 1. pp. 765–769.

In the quest for a method of killing virulent strains of plague without causing appreciable deterioration in the immunising power of the contained nucleo-protein antigen, the bactericidal action of ultraviolet light was employed, but it was ascertained that the killing of the organisms by the radiation from a quartz mercury lamp was accompanied by the destruction of the antigen. The wave length of the rays responsible for the killing was then ascertained, and was found to extend between the line 296 micro mu and the extreme limit of the available spectrum.

It was further ascertained that the absorption spectrum of nucleo-protein extract extended between the same limits. An emulsion of bacilli was then exposed to the entire radiation of a quartz lamp through the action of a solution of the antigen.

Thirty rats were inoculated with a vaccine prepared in this manner, the exposure varying from 5 to 20 minutes. Subsequently tested with a virulent culture, which killed 100 per cent. controls, the whole 30 inoculated rats died from pest. "It is concluded from these experiments that the bactericidal and antigen injuring regions of the spectrum are identical."

R. St. J. B.

MOSES (Arthur). **Studien über Immunität bei der Pest.** [Studies in Plague Immunity.] [Also in Portuguese.]—*Mem. Inst. Oswaldo Cruz.* 1914. Vol. 6. No. 2. pp. 100–111.

These studies consist for the most part in a repetition of some of Rowland's work with nucleo-protein extracts of the *Bacillus pestis*, obtained by means of the sulphating process. The antigens which were employed appear to have varied greatly in their toxicity, and it was sometimes observed that a large dose of toxic nucleo-protein had no effect on the experimental rat, while a smaller dose killed the anima with symptoms of toxaemia. In one instance the smallest lethal dose of the endotoxin was 0·1 mg., the animal surviving an inoculation with ·05 mg. All the animals inoculated with increasing doses up to 0·8 mg. died, but the rat that received 1·0 mg. remained alive.

R. St. J. B.

FLU (P. C.). **Het Uitzwavelen van Dessawoningen als Middel ter Bestrijding van Pest.** [Sulphur Fumigation in Plague prevention.] —*Geneesk. Tijdschr. v. Nederl. Indië.* 1914. Vol. 54. No. 5. pp. 552–569. With 5 illustrations, 1 diagram & 1 chart.

The quick and effective fumigation of peasant dwellings in Java has been accomplished by the author by means of an entirely new method, in which the whole structure to be fumigated is covered with a fabric impregnated with a substance which not only makes it impervious but also protects it from the deleterious action of sulphur dioxide gas.

The fabric used was a kind of "drill" known locally as "Kain Kajoe"; this was employed in rectangular pieces 20 by 15 metres and impregnated with the following mixture:—

Common asphalt	100 kilos.
Petroleum	10 to 15 litres.
Oil of Turpentine	10 litres.

The asphalt was first heated to melting point and then cooled down to 80° C., at which temperature the petroleum and turpentine were added. The impregnation of "Kain Kajoe" was carried out in a trough containing the mixture at a temperature of 80° C., the fabric being conveyed along the sides and bottom of the trough on rollers and the superfluous mixture being mechanically removed by iron scrapers attached to the trough. The prepared material was subsequently rolled up on its long axis and hoisted, by means of ladders, on to the roof of the house that had been selected for fumigation, and then let down on either side of the roof. In skilled hands the whole covering of the house did not occupy more than ten minutes and, when it was necessary to fumigate large houses, two or more sails could be joined together by means of metal clamps. A kind of imitation leather, sold under the trade name of "Ducks Q.O. Colour 22 lether, Grain Bright" was found to be just as efficacious as the prepared fabric, and although the initial cost was greater, it proved, in the long run, to be the more economical.

The employment of crude Japanese sulphur is recommended, and the fumigation of everything in the house should be carried out for at least three hours. This will kill most fleas, and all other ectoparasites but, as some of the fleas concealed in the flooring are apt to escape destruction, the subsequent use of an efficient floor disinfectant is insisted on.

R. St. J. B.

FLU (P. C.). **Maatregelen ter Voorkoming van Pest.** [Plague Prevention Measures.]—11 pp. With 4 text figs. & 3 diagrams. 1914. Batavia: Javasche Boekhandel & Drukkerij.

In this communication, the author, after briefly going over the evidence in favour of the rat flea as the carrier of plague infection to man, deals with the various methods of combating plague which have been employed as the result of the teaching of experience in special relation to conditions obtaining in Java. As he rightly points out, the essential matter to be borne in mind is the breaking of the connection between man and the rat and its ectoparasites. To this end the efficient rat-proofing of houses is absolutely necessary, and also the protection of food supplies from the attacks of rodents. Particular attention must be directed to proofing of "dead spaces" in walls, roofs and wainscottings and also to the efficient screening of water pipes. Dwellings with pervious roofs, which in all cases should be slanting and not flat, ought to be protected with a covering of sheet iron or tin.

R. St. J. B.

GUITERAS (G. M.). **Plague in Havana.**—*Jl. Amer. Med. Assoc.* 1915. Jan. 2. Vol. 64. No. 1. pp. 29–34. With 3 charts.

This report deals principally with the rigorous sanitary measures which were so successfully adopted to stamp out the small plague epidemic which was introduced into Havana, Cuba, from the Canary Islands in 1912. The routine disinfection of buildings was conducted by fumigation with hydrocyanic gas, the potassium cyanide used being inclosed in three thicknesses of manila paper which were dropped into receptacles containing dilute sulphuric acid. A period of 20 to 25 minutes elapses before the acid solution destroys the paper envelope and the chemical action begins, setting free hydrocyanic acid gas. During this period the operators can complete the arrangements for the fumigation of the premises in perfect safety. For fumigation of small spaces, such as rat holes, an ingenious apparatus was devised by the Chief Quarantine Officer. This consists of a wooden box, 12 by 4 inches containing two litre bottles connected to each other by glass tubing and each in turn to a rubber bulb and outer tube to which a glass nozzle is attached. The bottle to which the rubber bulb is connected is charged with dilute sulphuric acid, while the other bottle is charged with powdered potassium cyanide. By means of pressure on the bulb the acid solution is forced into the cyanide bottle, and the resulting hydrocyanic acid gas passes out through the glass nozzle, which has been fixed with cement mortar into the rat-hole selected for fumigation. Washing floors and walls with phenol disinfecting fluid ("Phenoco") and inundations with mild solutions of phenol disinfectants are recommended as after treatment.

One of the most striking features of the sanitary campaign was the depopulation of 17 blocks of buildings containing two bad foci of infection, and the drawing of a sanitary cordon round the infected area. The depopulation was completed within 24 hours and the zone was thoroughly disinfected block by block. Three weeks elapsed before the zone was opened up and the inhabitants were allowed to return.

R. St. J. B.

NAILOR (W. E.). **Plague Prophylaxis.** [Correspondence.]—*Indian Med. Gaz.* 1914. Dec. Vol. 49. No. 12. pp. 486–487.

The writer is of opinion that any attempt to kill off the rat population during plague epizootics has the effect of advancing rather than retarding the subsequent human epidemic. He bases this argument on the assumption that the eventual disappearance of plague from a locality is due to an active immunity acquired by the rats in the district, which in turn is transmitted to their off-spring [no account being taken of the seasonal variations in the flea population], and on the known fact that the rat flea has a distinct preference for its natural host. The conclusion arrived at is that not only should rat extermination not be attempted but rather that the rodents should be helped to acquire immunity "if it is any protection."

R. St. J. B.

BACOT (A.), PETRIE (George F.) & TODD (Ronald E.). **The Fleas found on Rats and other Rodents, living in Association with Man, and trapped in the Towns, Villages and Nile Boats of Upper Egypt.**—*Jl. of Hyg.* 1914. Dec. Vol. 14. No. 4. pp. 498–508. With a map.

During an enquiry into the plague conditions of Upper Egypt, carried out in 1912 and 1913 on behalf of the Egyptian Government, collections of fleas obtained from rats and other rodents, inhabiting the native houses or the Nile boats, were made for the purposes of examination and identification. The localities from which the fleas were collected extended from Cairo to Komomobo, the most extensive collection of the series being made from the town of Assiut, where rat trapping operations had been continuously carried on for a period of two years.

In the determination of species in the case of small collections, every individual flea in the collecting tube was examined separately, but with large collections, samples of from 500 to 2,000 fleas were identified.

As might have been expected the commonest flea found was *Xenopsylla cheopis*, which indeed on animals trapped on land accounted for from 90 to 100 per cent. of the total numbers found.* Exceptions to this rule were however forthcoming. A specimen of *Gerbillus pyramidum*, caught wild, yielded a high percentage of *Xenopsylla cleopatrae*; a species of hedgehog showed a distinct preponderance of *Ctenocephalus felis*; a weasel carried *Echidnophaga gallinaceus*; and *Acomys cahirinus* from Cairo showed a marked infestation with *Xenopsylla chephrenis*. 265 specimens of this flea were found, 221 being from Cairo; the remaining 44 were captured at Assiut. Forty-three were on *Acomys* trapped in houses and one was from a *Mus norvegicus* from a Nile boat. With regard to the fleas found on rats inhabiting the Nile boats (feluccas) it was found that *Xenopsylla cheopis* was for the most part replaced by *Leptopsylla musculi*, which in one sample amounted to 85 per cent. of the fleas found, *Mus norvegicus* being the principal host. This species of flea appears to be mainly restricted to Lower

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* It is of interest to note that 96 per cent. of the fleas caught on the cloths of rat catchers in plague infected houses were of this species.

Egypt, and either the feluccas are infested from this source or the conditions on the Nile boats are more favourable to it than those in the rat-nests on land in Upper Egypt. Only three specimens of *Ceratophyllus fasciatus* (all from *Mus norvegicus*) were identified.

The numbers of *Pulex irritans* found on rats was exceedingly small, especially as human infestation with this species was often found to be extremely heavy.

R. St. J. B.

Cunha (R. de Almeida). **Contribution to the Knowledge of the Brazilian Siphonaptera.** [Also in Portuguese.]—*Mem. Inst. Oswaldo Cruz,* 1914. Vol. 6. No. 2. pp. 124–136. With 2 plates & 3 text figs.

A description is here given of a new genus, three new species, and a new variety of *Siphonaptera,* which have been recently identified by the author in Brazil.

1. *Stenopsylla* (new genus). The type of this genus is *Stenopsylla cruzi* (Cunha), of which 5 males and 6 females have been captured on *Didelphys aurita* and 2 males and 1 female on *Didelphys opossum.* The genus *Stenopsylla* is allied to *Typhloceras* (Wagner), *Plaeopsylla* (Wagner), *Dinopsylla* (Jord. and Roths.) and *Hypsophthalmus* (Jord. and Roths.). The frons is larger than in *Paleopsylla* and *Dinopsylla,* and more bristly than in the two other genera. The modified segments of the male are entirely different from the other four genera, and the oblique direction of the genal ctenidium, with quadrangular teeth, is also characteristic.

2. *Rothschildella occidentalis* (Cunha). A single specimen was collected from *Dasypus novemcinctus.* The differences between this species and *R. cryptoctenes* (Enderlein) are in the character of the eighth sternite, which is less bristly and less sinuous, in the *bursa copulatrix* and in the two apical, long hairs on the five segments of the posterior tarsi.

3. *Pulex conepati* (Cunha). The labial palps are shorter than the maxillary palps and reach the middle third of the anterior coxa, but at a point nearer the base than in *Pulex irritans.* Other points of difference may be found in the arrangement and number of the thoracic and abdominal bristles and in the modified segments. The host of this species is *Conepatus suffocans* (Illiger).

4. *Pulex irritans* var. *bahiensis* (Cunha). Some 20 males of this variety were collected from the neighbourhood of Bahia. The female has not yet been found. The host is *Homo sapiens.* The differential characteristics between this variety and *P. irritans* are principally in the modified segments of the male. The colour is darker, and the abdomen more convex than in *P. irritans*; the basal sternite is also larger.

R. St. J. B.

Fox (Carroll). **A Further Report on the Identification of some Siphonaptera from the Philippine Islands.**—*Treasury Dept. U.S. Public Health Service. Hygienic Laboratory Bull.* No. 97. 1914. Oct. p. 18.

In this paper the author confirms his previous observations with regard to *Xenopsylla cheopis* and *Ctenocephalus canis*, namely that the former is the only rat flea found in the Philippines and that the latter, as in India and Panama, appears to be absent from the Islands.

The previous statement that *Ctenocephalus felis* Bouché, of the Philippine Islands, differed from that of the United States and Europe is here corrected; "the differences pointed out at the time not being differences at all, but common characteristics."

R. St. J. B.

Wherry (William B.). **A New Bacterial Disease of Rodents transmissible to Man.**—*U.S. Public Health Rep.* 1914. Dec. 18. Vol. 29. No. 51. pp. 3387–3390.

A new plague-like disease of the Californian ground squirrel (*Citellus beechyi*) was first described by McCoy in 1911, who in association with Chapin, isolated the causal organism, *Bacterium tularense*, in the following year. The virus was found to be extremely pathogenic to guinea-pigs, rabbits, white rats, grey mice, ground squirrels (*C. beechyi*), the gopher (*C. bottae*) and the Java and Rhesus monkey; while the adult Norway rat (*M. norvegicus*), the calf, pig, goat, cat, dog and pigeon were found to be immune. Two human cases were subsequently described by Wherry and Lamb, in which with the finding of the causal organism was associated a condition of acute ulcerative conjunctivitis with adenitis of the periauricular and cervical glands, accompanied with high temperature and marked prostration. In both these cases it was shown that the patients had handled and dissected wild rabbits, and as rabbits infected with *B. tularense* were found in the neighbourhood from which one of the cases came, it is reasonable to suppose that infected rabbits were the source of infection.

It is not yet possible to say if infection can be conveyed to human beings through less direct sources than the conjunctiva, but on the basis of animal experiment it seems probable that ulcerative rhinitis, ulcerative or membranous sore throat, gastro-intestinal infection, or lymphadenitis secondary to cutaneous infection may occur. The disease among rabbits is probably very wide-spread throughout Indiana and Kentucky and suspicious cases have also been reported from Ohio. With regard to the natural method of transmission among rodents, the author is inclined to the view of a gastro-intestinal infection, although he admits that it may be possible to transmit the disease by means of infected rodent fleas.

R. St. J. B.

Wayson (N. E.). **Plague and Plague-like Disease. A Report on their Transmission by *Stomoxys calcitrans* and *Musca domestica*.**—*U.S. Public Health Rep.* 1914. Dec. 18. Vol. 29. No. 51. pp. 3390–3393.

The plague-like disease affecting rodents in California, the causal organism of which (*Bacterium tularense*) has been isolated by McCoy and CHAPIN, appears to be capable of transmission from infected to healthy animals by means of the stable-fly (*Stomoxys calcitrans*) and the common house-fly (*Musca domestica*).

Stable-flies, confined in glass phials covered with a single layer of surgical gauze, were allowed to bite guinea-pigs suffering from *tularense* infection, and subsequently to feed on healthy animals The flies were found to be capable of transmitting infection for one hour after the infecting meal, but after that period successful transmissions could not be obtained. The minimum number of bites necessary for the fly to become infected has not been ascertained, but in the positive experiments the flies were allowed to bite eight times; four bites only not being sufficient to cause infection. Similar results were obtained with stable-flies used in plague transmission experiments.

Tularense infection has also been successfully transmitted by means of *Musca domestica*. The flies were allowed to feed on the 48-hour-old viscera of an animal dead of plague-like disease and then washed in 2 cc. salt solution. One cc. of this washing was injected subcutaneously into a guinea-pig, and death from *tularense* infection occurred on the fifth day after inoculation. Infected flies were also able to transmit infection when permitted to crawl over the conjunctiva prepared by cocainization and traumatized by rubbing a few grains of sand between the ocular and palpebral conjunctiva The infection of the two human cases, cited by WHERRY [see above], may have occurred in a similar manner.

R. St. J. B.

HOSSACK (W. C.). **A Review of the Eighth Report of Plague Investigations in India.**—*Indian Med. Gaz.* 1914. July. Vol. 49. No. 7. pp. 286–288.

The scope of this article, which is intended as a criticism of the Eighth Report of the Advisory Committee for Plague Investigation in India, may be gathered from a perusal of its final paragraph, which states :—" The final conclusion one must come to is that there is no reason why such volumes as the present under review should not be produced in infinite series, but until the basis of work is somewhat altered they will add little to our knowledge of plague in India."

R. St. J. B.

MARTINI (Erich). **Massregeln gegen die Lungenpest.** [Measures against Pneumonic Plague.]—*Deut. Med. Woch.* 1915. Jan. 1. Vol. 41. No. 1. pp. 12–14.

The author appears to be seriously of opinion that the presence of Indian and other Asiatic troops in close proximity to the German trenches in Flanders and Northern France, carries with it the danger of importation of pneumonic plague. He points out that GOTTSCHLICH recovered virulent plague bacilli from the sputum of a convalescent patient in Egypt on the 76th day after infection with secondary plague pneumonia.

The greater portion of the communication is taken up with a discussion of the means of combating such a hypothetical outbreak, should it arise. It cannot be said that it adds any fresh conceptions to our knowledge of prophylaxis in pneumonic plague.

R. St. J. B.

Liston (Wm. Glen). **Report of the Bombay Bacteriological Laboratory for the Year 1913.**—24 pp. f'cap. 1914. Bombay: Govt. Central Press. [Plague.]

The portion of this report that deals with plague is concerned with statistics of inoculation, nature of vaccines used, and plague research work.

Further experiments on fumigation by hydrocyanic acid gas were carried out. As a preliminary experiment a small rat-proof experimental godown was filled with bags of rice, and rats were allowed to run freely among them. As the result of hydrocyanic acid gas fumigation, all the animals were killed, no dead rats being found within the grain bags. Fleas in bulk rice do not burrow deeply enough into the rice to escape destruction by the gas, which does not penetrate into bags of rice further than 2 or 3 inches. Half an ounce of potassium cyanide per 100 cubic feet was found to be sufficient to disinfect a barge of a capacity of 12,000 feet; nearly all rats and fleas placed in different situations in the hold being killed after an exposure of four hours to the action of the gas. A considerable number survived an exposure of one hour.

An epizootic was started in a godown, in which a plentiful supply of fleas was introduced along with bundles of old clothing or gunny bags half full of rice. The clothes or gunny bags were subsequently removed to flea-free godowns in which susceptible rats had been installed. It was found that infection was readily carried in the clothing, but no case of plague appeared among the rats that were in association with the grain bags.

Experiments were made to test the efficiency of the treatment of of plague by means of tincture of iodine, either by giving five drops every three hours by the mouth while iodine was applied locally to the buboes, or by injecting 7 minims of the tincture in saline intravenously once in every 24 hours, as recommended by Captain Powell Connor, I.M.S. [this *Bulletin*, Vol. 2, p. 72]. The following table shows the results obtained with these methods of treatment and with controls which received the ordinary treatment of the Maratha Plague Hospital; the cases are divided into groups according to the severity of the septicaemia :—

Treatment adopted.	No bacilli in ·25 cc. of blood.		Less than 10 bacilli in 25 cc. of blood.		More than 10, but less than 100 bacilli in 10 cc. of blood.		More than 100 bacilli in ·25 cc of blood.		Total treated.	
	Recovered	Died.	Recovered.	Died.	Recovered	Died.	Recovered.	Died.	Recovered	Died
Controls on ordinary treatment ..	3	4	1	1	..	3	..	8	4	16
Iodine administered by the mouth	6	3	2	1	..	1	..	7	8	12
Iodine administered intravenously ..	3	4	..	3	..	3	..	7	3	17
Total ..	12	11	3	5	..	7	..	22	15	45

The number of cases treated in each group is not sufficiently large to allow of any definite conclusion to be made regarding the comparative efficiency of any of the above methods of treatment. The percentage of recoveries are not so high as in the cases reported by Commissioner Booth Tucker as the result of iodine treatment. These cases reported by the Salvation Army probably included some mild cases, whereas all the cases in the above table were suffering from a severe form of the disease. Moreover, the Salvation Army cases came earlier under treatment; in Liston's cases treatment was not commenced until 24 hours or more after the onset of symptoms.

R. St. J. B.

ERRATUM.

Vol 5. p. 19, line 8—for *Pigiopsylla* read *Pygiopsylla*.

SLEEPING SICKNESS.

OUZILLEAU (F.). **Rapport d'ensemble sur la Maladie du Sommeil dans le Bas-M'Bomou (1912–1913).**—*Bull. Soc. Path. Exot.* 1915. Mar. Vol. 8. No. 3. pp. 138–154.

The author gives a detailed account of the district of Bas-M'Bomou, French Congo, of its flora and fauna, and of its geological characters. The inhabitants can be divided into three great groups: N'Zakara, Yakoma and Zandé. Of these the N'Zakara alone enjoy considerable prosperity and are almost exempt from sleeping sickness. The Yakoma and Zandé countries are on the other hand active foci of sleeping sickness. Owing to the fact that N'Zakara lies between these two infected regions, it is necessary to find some means of limiting the scourge and of preventing it from spreading into the district which has hitherto escaped.

Prophylactic measures were undertaken by the author in March, 1912; the measures adopted were based on the belief, founded on observation, that man is the principal reservoir of the virus, that an infected person is capable of contaminating the district, and finally that an actual and permanent sterilization of the peripheral circulation is obtained by the use of atoxyl.

In order to attain the desired result it was necessary to act quickly, as all delay was marked by a serious advance of the disease which rendered the task to be accomplished longer and more difficult.

If the task was arduous, it did not appear impossible for the following reasons:—

(1) The country of Yakoma is small and limited in the north by an uninhabited zone, so that if the disease could not be exterminated it could at least be prevented from spreading.

(2) Although the country of Zandé was not so circumscribed as that of Yakoma, yet it had the advantage that the inhabitants had been thoroughly examined owing to the fact that they were not very numerous and were subject to authority.

(3) Sleeping sickness is prevalent amongst the labourers and personal servants of Europeans. This constitutes a danger, which has frequently been noted; these people carry the infection to districts previously free such as for example Zandé and N'Zakara. In conclusion the author emphasises the importance of a thorough supervision of the movements of such employees and of efficient treatment of those that are infected.

W. Yorke.

ROUBAUD (E.). **Les Zones à Tsétsés de la Petite-Côte et du Bas-Saloum (Sénégal).**—*Bull. Soc. Path. Exot.* 1915. Mar. Vol. 8. No. 3. pp. 130–137.

The foci of trypanosomiasis on the littoral of Senegal have already been studied by THIROUX and his collaborators. In this paper the author deals with the haunts of *G. palpalis* in the Petite-Côte and defines the belt of tsetse which extends between the estuary of the English Gambia and that of Saloum.

The most important focus of trypanosomiasis in Bas Senegal is that in the vicinity of Nianing. Roubaud made a rapid journey through Thies, Nianing, Ngazobil and Fatick. On this tour he found *G. palpalis* only, but records that *G. longipalpis* was taken by THIROUX and D'ANFREVILLE.*

A general description of the vegetation of the country is given. The palpalis area at Nianing is essentially a Savannah park containing baobabs, ficus, tamarinds and cotton trees, whilst between them is a dense bushy growth, partly zerophilous and partly halophilous, of jujube trees, mimosas, acacias and tamarisks. The fly was found in abundance in the bush as well as in the vicinity of the dry swamp; it was absent only in particularly arid places where thorn trees alone were found.

The author considers the peculiar distribution of *G. palpalis* in the Petite-Côte to be due to the physical characters and geographical orientation of the district.

In addition to the human trypanosome the palpalis of Nianing transmits at least two animal trypanosomes. A kid upon which sixty *G. palpalis* were fed for three days became infected with *T. cazalboui*. Of seven horses examined at Nianing four were infected with *T. dimorphon* and one with *T. cazalboui*; as a rule horses do not survive two winters in Nianing.

Roubaud writes that it would be of great importance to attempt to destroy this focus of trypanosomiasis as it is very prejudicial to commerce, and the area infested is not very extensive. An experimental clearing of shrub had been undertaken previously, but it was on too small a scale. To obtain appreciable results it would be necessary to clear the whole zone between the marsh and the sea.

In the Bas Saloum two species of tsetse were encountered—*G. palpalis* and *G. morsitans*. The former was found in all the mangrove area in Saloum, being especially numerous around Foundiougne; the latter is a veritable scourge in the Bas-Saloum particularly in the province of Niom-Bato which is a very important centre of cattle trypanosomiasis. Niom-Bato lies between the estuary of the Gambia and that of the Saloum. It is essentially a park-like country; villages are rare, and the bush is inhabited by game, especially the larger antelope. That which constitutes the special characteristic of this region is the existence of brackish marshes subject to the influence of the tide. The sea penetrates into the heart of the savannah in the form of narrow fjords fringed with mangroves. At low tide the water recedes from the land on which monkeys, antelopes and crabs can be seen. Apart from this abundant maritime irrigation there is little water. Wells are rare and often at a distance from the villages. After passing the salt swamps *morsitans* becomes rarer and gives place frequently to *palpalis*. The fundamental differences in hygrophilia between the two species is shown in a table; the relative humidity of the atmosphere in the places where *morsitans* was found was between 28 and 50 per cent., as compared with 70 per cent. where *palpalis* was encountered.

No human trypanosomiasis has been found in the Bas-Saloum. As in the Upper Gambia the presence of *G. morsitans* is coincident with the complete absence of domestic stock; in the infested area there are no dogs, horses, asses, sheep or large-sized cattle. In the villages (Sokone and Sandikole) outside, but within twenty kilometres of, the infested zone dogs and horses are found, but their wanderings expose them to the attacks of fly and there is a heavy mortality amongst them.

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* La Maladie du Sommeil et les Trypanosomiases animales au Sénégal. 1911. Paris: Librairie J.-B. Baillière et Fils, 19, Rue 1 & Autefeuille, 19.

In the whole tsetse area the only domestic animals found are goats, which do not leave the villages, and the little Fouta oxen which graze constantly amongst the Glossina just as is the case in the Upper Gambia. It is remarkable that whereas in the latter country these cattle are used as beasts of burden, in Niom the natives are afraid to work them for fear of losing them. Roubaud explains this loss of resistance in Niom by the insufficiency of the water supply.

T. dimorphon was found by a rapid examination of the blood in three of thirty oxen at Messira. An examination of fifteen wild Glossina showed three of them to have an "*infection totale*" typical of *T. dimorphon.* A goat on which 80 wild Glossina were fed became infected with *T. cazalboui.*

In conclusion the author points out that the development of the district of Niom-Bato is profoundly impeded by the presence of *G. morsitans*, and that the country is a blot amongst the rich provinces of Sine and Saloum. From an economic point of view it is most desirable that a systematic campaign against Glossina should be undertaken in Niom-Bato. The fly belts of Niom, which are no more than a tithe of those which existed formerly in the whole savannah bordering the Gambia, would disappear completely after clearing and destruction of the big game, as they have already disappeared from the districts along the rivers in the mid portion of the Gambia.

W. Y.

KOCH (H.). **Bericht über einen Versuch, *Glossina palpalis* durch Fang zu beseitigen.** [An Attempt to exterminate *Glossina palpalis* by Capture.]—*Arch. f. Schiffs- u. Trop. Hyg.* 1914. Vol. 18. No. 24. pp. 807–810. With 1 curve.

The experiment reported in this paper lasted from the 29th January, 1913, to the 31st January, 1914. It was carried out in the island of Mugassiro in Mara Bay on the east of the Victoria Nyanza. The operators were four expert fly catchers who used nets. One pair relieved the other every quarter. It is stated that this change was necessary because the boys soon grew tired of the monotonous work, and it had the advantage that the results of one pair controlled those of the other, showing whether a decrease in catch meant an actual diminution or was due to slackness. The island is about three kilometres in circumference, uninhabited, and covered thickly with bush down to the beach. It abounds in crocodiles. In places the shore is steep and large masses of rock are present, making it doubtful whether the experiment could have succeeded. The fly catchers slept on the mainland. The daily catch of flies was put in glass vessels half filled with alcohol, and sent at ten day intervals to the camp on the mainland, where the flies were counted. In the months of April, September and January the results of the fly catchers were controlled on several days. Pupae were looked for on these occasions; the results were unsatisfactory; scattered pupae alone were found.

A table shows the fly-catching results for each month and the numbers of the sexes. Flies were caught on 340 days, in all 74,382, of which 49,883 were male and 24,499 female, and a similar preponderance of males was maintained throughout. The largest average daily catch was made in April (541) and the smallest in December (78). The average daily catch in January 1913 was 205, in January 1914, 102, but in the first January only three days were available. The result is also shown in a curve on which is plotted the rainfall on the mainland. Up to September the curve of catch corresponds closely with the curve of rainfall, being greatest in April when most rain fell and lower in the dry months. The author thinks that this diminution is due to the dry weather rather than to the efforts of the fly catchers. As the figures show the flies were not exterminated. The poor result is attributed to the formation of the island offering the flies many places of concealment from the catchers and it is admitted that the personnel was insufficient. It is concluded that the attempt in the case of such an island is not worth making.

[Clearly no general conclusion can be drawn. It would probably be better in such a case to use not less than twenty fly catchers and to break off the experiment if no marked effect were evident after three months or less. An account of a very similar experiment will be found in this *Bulletin*, Vol. 3, p. 174.]

A. G. B

i. Glaeser (Hans). **Bestimmungsschlüssel der in Kamerun und Togo bekannten Tsetsearten.** [Key to the Species of Tsetse in Cameroons and Togo.]—*Arch. f. Schiffs- u. Trop. Hyg.* 1914. Aug. Vol. 18. No. 16. pp. 571–573.

ii. Morstatt (H.). **Bestimmungsschlüssel der in Deutsch-Ostafrika bekannten Tsetsearten.** [Key to the Species of Tsetse in German East Africa.] - *Ibid.* pp. 574–575.

i. The basis of this paper is the collection of flies in the Zoological Museum at Berlin. In the Cameroons the following species are said to be found :—*Glossina ziemanni* Grünb., *G. tachinoides*, *G. pallicera*, *G. caliginea*, *G. palpalis* and *G. tabaniformis*. It is noted that *G. morsitans* and the whole of the *morsitans* group are wanting. What has hitherto been known generally as *G. morsitans* should probably be called *G. tachinoides*. The species named after Ziemann has been found once only.

The species found in Togoland are *G. palpalis*, *G. longipalpis*, *G. morsitans* and *G. fusca*.

ii. The species found in German East Africa are *G. palpalis*, *G. austeni* (*tachinoides* of previous authors), *G. morsitans*, *G. pallidipes* and *G. brevipalpis* (formerly *fusca* plus *tabaniformis*).

[It is seen that the surmise to which Neave gave expression [see this *Bulletin*, Vol. 1, p. 278], that the *G. tachinoides* of German East Africa would prove to be *G. austeni*, appears to have been well founded.]

A. G. B.

VAN DEN BRANDEN (F.). **Seconde Note Préliminaire sur le Traitement de la Trypanose Humaine par Salvarsan-Kupfer.**—*Arch. f. Schiffs- u. Trop. Hyg.* 1914. Nov. Vol. 18. No. 22. pp. 743–758.

An account of the author's preliminary paper was given in this *Bulletin*, Vol. 3, p. 167. The present paper gives the results, chiefly in tabular form, of 43 cases treated. The table, which affords evidence of the care with which the patients were watched, gives in each case the name, sex and weight; the state of the cerebro-spinal fluid before treatment; the amount and date of the injection or injections; the dates on which the blood was centrifuged, with the result; the state of the cerebro-spinal fluid after treatment; and the result of the treatment.

Of the cases with normal cerebro-spinal fluid (*i.e.* less than 5 cells per cmm) in nine there had been no relapse after 14, 14, 14, 13, 10, 12, 11, 11 and 11 months, and in eight of these cases the cerebro-spinal fluid remained normal [of the ninth there is no information]. This was the result of a single dose (·1 -·3 gm.) in every instance but two, in which two doses were given. The number of times the blood was centrifuged with negative result lay between 14 times and 21 times in each case. Other cases had been trypanosome free for shorter periods.

In thirteen other instances in which the cerebro-spinal fluid was normal a relapse occurred after 11 months, 8 months, and lesser periods down to 24 days. One or two injections only had been given. One patient died the day after his injection, another four days later. The dose was in the first case ·3 gm; in the second ·2 gm; both became jaundiced.

Of the patients with altered cerebro-spinal fluid all relapsed and many died.

The author points to the excellence of the results in early cases, having regard to the opinion of BRODEN and others that a patient at the first stage whose blood is sterile eight months after treatment can generally be regarded as cured.

Advanced cases do better with small doses of atoxyl or atoxyl and antimony. Three advanced cases had a series of injections of salvarsan copper, with no benefit. The doses, ·6 and ·8 gm. in all, were well borne.

In his conclusion the author remarks that doses of 0·005 gm. and ·0025 gm. per kilo body weight have given blood sterilisations of long duration and perhaps definitive cure. He recommends that the former dose be not exceeded. He suggests that still better effects may be obtained with repeated doses or in association with other drugs. He thinks that the sodium salt of salvarsan copper will be more convenient for use than salvarsan copper itself, if not more effective.

A. G. B

LANFRANCHI (Alessandro). **L'Oftalmo e l'Intrapalpebro-Reazzione nella Diagnosi e nella Differenziazione di Alcune Tripanosomiasi. Nota Preventiva.** [The Ophthalmic and Intrapalpebral Reaction in the Diagnosis and Differentiation of Trypanosomiasis. Preliminary Note.]—*Bull. Soc. Path. Exot.* 1915. Mar. Vol. 8. No. 3. pp. 112–115.

As a rule it is not possible to arrive clinically at a diagnosis of the various trypanosomiases of animals; moreover, the various experimental means of differentiation are not easy, some on account of their complexity being hardly practicable, and others are still of questionable value. A simple and certain method of diagnosis which would be of value in practice has still to be found. With this object in view the author made experiments using the ophthalmic and intrapalpebral reactions.

Dogs and horses infected with surra were employed, healthy animals and animals infected with *T. brucei* serving as controls. With the employment of the technique of LEVADITI antigen was prepared from extracts of *T. evansi* in water, alcohol, glycerine, ether and chloroform. The technique employed in the reaction was similar to that commonly used in the case of animals infected with glanders and tuberculosis.

The conclusions are:

Using a glycerine or alcoholic extract of infective trypanosomes it is possible by means of the ophthalmic reaction not only to diagnose surra in the dog but to distinguish this from nagana.

In horses similar results were obtained with the same extract, not only with the ophthalmic but also with the intrapalpebral reaction.

The author intends to ascertain whether, and to what extent, a slight rise of temperature resulting from the intrapalpebral test during an afebrile period in infected horses is diagnostic.

W. Y.

WEBB (E. Clive). **Trypanosomiasis of Donkeys and Mules in the Anglo-Egyptian Sudan. Some results of Transmission Experiments and Arsenical Treatment.**—*Jl. Comp. Path. & Therap.* 1915. Mar. 31. Vol. 28. No. 1. pp. 1-20.

Trypanosomiasis causes heavy mortality among the transport animals of the Sudan. Every year a large number of donkeys and a lesser number of mules examined at the Chief Veterinary Hospital, Khartoum, are found to be suffering from trypanosomiasis; the animals had contracted the infection when on transport work in the Bahr-el-Ghazal province. When seen at the hospital the beasts were almost invariably in an advanced state of the disease; the mortality amongst them has been, so far as can be ascertained, 100 per cent. Besides these many other animals die in the provinces so that it is impossible to estimate the total losses. In mules and donkeys the onset of the disease is insidious and in many cases its course is very chronic.

A description of the parasite is given. It is polymorphic and the author is of opinion that it must be regarded as identical with *Trypanosoma brucei*.

Encouraged by the work of HOLMES [see *Sleeping Sickness Bulletin*, Vol. 2, p. 128], who found that by the administration of arsenic in suitable doses at least 70 per cent. of horses suffering from surra, even when contracted spontaneously and in the last stage of the disease, can be cured, the author decided to give the arsenical treatment an extended trial, and with this object nineteen donkeys and three mules were treated; of this number twelve died and ten (45 per cent.) were discharged as cured. Webb points out that this does not equal the results obtained by HOLMES, but provided the recoveries are permanent

the results are not unsatisfactory. The majority of the animals treated were in a very poor condition when first seen and several of them were *in extremis*. The amount of arsenic given has an important bearing on the results. In the author's experiments the dosage was very severe, but as a rule the arsenic was well tolerated.

Protocols are given in which details regarding the amount of arsenic administered and the result of the examination of the blood and general condition of the animal are reported.

The following are the conclusions:

> "Arsenic appears to have a specific action in a large percentage of cases, and clears the blood of trypanosomes.
>
> "In the light of the experiments of Holmes and others, there seems no reason to doubt that a permanent cure may be effected in a large percentage of cases. As the result of my own experiments, I provisionally claim 45 per cent. of cures, but prefer not to make a more definite assertion until these apparently cured cases have been under observation for a longer period.
>
> "The results so far justify a more extensive trial 'in the field,' more especially as no other drug has so far been proved to be of greater value. To obtain successful results one must be prepared for casualties due to individual susceptibility and overdosage."

W. Y.

VELU. **La Maladie de Fez, Trypanosomiase des Chevaux du Maroc. Note préliminaire.**—*Bull. Soc. Path. Exot.* 1915. Mar. Vol. 8. No. 3. pp. 115–117.

Animals affected show all the principal symptoms of trypanosomiasis. The onset is overlooked and the course of the disease insidious. There is progressive feebleness and emaciation which may become extreme, and finally difficulty in walking owing to involvement of the hind legs. Symptoms of secondary importance are digestive disturbances; the appetite is capricious, whilst there may be enteritis and icterus. Slight febrile attacks of short duration are observed from time to time. The disease is not necessarily fatal.

The pathogenic agent is a trypanosome, but the parasite is rarely seen in the peripheral blood of the horses. When seen in the blood of a rabbit the parasites resemble that of nagana or surra. It measured about 20μ in length and always had a free flagellum; the centrosome stains well. The course of the disease in the rabbit was similar to that due to other pathogenic trypanosomes: the animal died in 20 days with the usual symptoms.

The author writes that as the identification of a trypanosome by means of the microscope alone is impossible owing to the morphological similarity of all the African trypanosomes—trypanosomes of the type *cazalboui* and *dimorphon* excepted—he is at present unable to name this parasite. It is evidently not that which causes dourine, but possibly is identical with the trypanosomes which cause Mal de la Zousfana or debab.

W. Y.

ROSENTHAL (Felix) & KLEEMANN (Erich). **Ueber die Einwirkung von mütterlichem und fötalem Menschenserum auf Trypanosomen.** [The Action of Maternal and Fœtal Human Serum on Trypanosomes.] —*Berlin. Klin. Woch.* 1915. Jan. 25. Vol. 52. No. 4. pp. 75–77.

The authors recall that EHRLICH and WECHSBERG made a comparative study of the action of human serum, from the sick and sound respectively, on trypanosomes and showed that when liver disease was present the amount of trypanocidal substances in the serum was considerably diminished. Their own experiments were made with a highly virulent strain of nagana in mice. The foetal blood was obtained from the umbilical cord at the moment of ligature. The experiments showed that the child's serum in comparison with that of the mother is almost wanting in trypanocidal substances—as far, at least, as the quantity of serum used is concerned. The table on page 416 (one of four) illustrates this.

A similar result was obtained with a curative experiment, four infected mice treated with the serum of the mother being forty days free from trypanosomes, whereas of the six mice treated with the same doses of the child's serum only one survived to the seventh day, the others dying on the fourth. In another experiment the child's serum had a definite prophylactic effect, but far inferior to that of the mother. The question is discussed whether the trypanocidal substances develop spontaneously in the foetus or filter through the placenta, without a definite conclusion being reached. An experiment showed that the serum of a six months foetus had no trypanocidal effect. Attention is drawn to the striking curative effect of the serum of a pregnant woman even in very small quantity. In the last period of gestation there seems to be a large increase of trypanocidal substances in the serum.

[NEUMANN (1911) showed that mice treated with the serum of recently delivered women remained for weeks resistant to trypanosome infection (*T. brucei*) (*Sleeping Sickness Bulletin*, Vol. 3, p. 354).]

A. G. B.

BROWN (Wade H.). **Concerning Changes in the Biological Properties of *Trypanosoma lewisi* produced by Experimental Means, with Especial Reference to Virulence.**—*Jl. Experim. Med.* 1915. Apr. 1. Vol. 21. No. 4. pp. 345-364.

The author refers to his previous work [see this *Bulletin*, Vol. 4, p. 271.] "The object of the [present] investigation was to obtain indications of the nature and mode of action of the factors influencing the biological properties of *Trypanosoma lewisi*." It is stated that "the results must be interpreted in a broad sense, as much of the detail requires long and careful study." Full accounts are given of the sources and nature of the strains used, and tabular protocols are appended. It was found that the tendency of rapid passage was to shorten the incubation period. Also, rapid passage of *T. lewisi* tends to advance the time at which multiplication begins in the blood of the rat. Infections of *T. lewisi* are often chronic, but exceptions are not uncommon. "Mere regulation of the rate of passage of the virus

ROSENTHAL & KLEEMANN, TABLE I.—Prophylactic Experiment.

Intraperitoneal Infection. Serum introduced subcutaneously.

Day after Infection.	Serum of Mother.					Serum of Child.					Controls.	
	1·0 cc.	0·5 cc.		0·25 cc.		1·0 cc.	0·5 cc.		0·25 cc.			
	1	2	3	4	5	8	9	10	11	12	6	7
1	0	0	0	0	0	(+)	0	(+)	(+)	(+)	+	+
2	0	0	0	0	0	+	(+)	+	+	++	+++	+++
3	0	0	0	0	0	++	+	++	++	+++	†	†
4	0	0	0	0	0	+++	++	+++	+++	†	—	—
5	0	0	0	0	0	†	+++†	†	†	—	—	—
7	0	0	0	0	0	—	—	—	—	—	—	—
9	0	0	0	0	0	—	—	—	—	—	—	—
11	0	0	0	0	0	—	—	—	—	—	—	—
13	0	0	0	0	0	—	—	—	—	—	—	—
15	0	0	0	0	0	—	—	—	—	—	—	—
16	0	0	0	(+)	(+)	—	—	—	—	—	—	—
18	0	0	0	+++†	+++†	—	—	—	—	—	—	—
22	0	0	0	—	—	—	—	—	—	—	—	—
26	0	0	0	—	—	—	—	—	—	—	—	—

from one rat to another seems sufficient so to alter the biological properties of *T. lewisi* as to change an infection that is usually chronic into one that may be regarded as acute, or vice versa."

In connection with changes in virulence, the author states :—" The basis for estimating the virulence of *T. lewisi* in these experiments was the incidence, especially serial incidence, and degree of such symptoms of intoxication as stupor, weakness, loss of weight, and anemia, together with the mortality definitely attributable to infection with *T. lewisi*; very little account was taken of isolated instances of severe intoxication or even death." Another factor was the time at which the transfer of the trypanosomes was made. There seems to be an interrelation between virulence and morphological variation, the latter occurring mainly in infections of considerable severity. It must be remembered that the transference of relatively large quantities of blood containing but few trypanosomes involves the introduction of an unknown amount of immune bodies. The author notes " two distinct classes of immunological reaction, one of which is concerned in checking the multiplication of trypanosomes, as ordinarily understood, and the other in their destruction." Small rats seemed to be more easily infected than large rats.

The author's summary is as follows :—

" 1. Different strains of *Trypanosoma lewisi* represent different states of biological balance, especially between the powers of propagation and resistance to destruction.

" 2. The biological status of a given strain of *Trypanosoma lewisi* is subject to cyclic variations as the result of immunological reactions in the blood of the host.

" 3. The factors limiting reproduction and causing destruction of *Trypanosoma lewisi* in the blood are appreciably independent of each other. It is possible, therefore, to influence these processes separately and even in opposite directions.

" 4. The virulence of *Trypanosoma lewisi*, manifested in its highest form, is dependent upon some degree of reproductive fastness, strong antigenic action, and susceptibility to destruction, varying degrees in the development of these properties producing corresponding variations in the degree of virulence.

" 5. By a properly regulated system of passage the properties of *Trypanosoma lewisi* that determine its infection cycle and its virulence may be eventually so altered as to change completely both the nature and course of the infection. Such a system of passage must be adapted to the particular strain of *Trypanosoma lewisi* used.

" 6. Immunological reactions exercise a dominant influence in determining the ultimate biological variations of *Trypanosoma lewisi*."

H. B. Fantham.

YAWS.

DAVEY (J. B.). **Observations on Medical Matters in the Dedza District.** [No. 18 Yaws].—*Annual Medical Report on the Health & Sanitary Condition of the Nyasaland Protectorate for the Year ended 31st Dec. 1913.* 1914. Zomba: Printed by the Goverment Printer. pp. 100–103.

These notes were taken by the author during the course of sleeping sickness investigations in that part of the Dedza District (Nyasaland) which lies between the lake shore and the foothills; as will be seen by Table III, on opposite page, yaws is extremely prevalent amongst the natives of this region.

Excluding for the present the Amalawi, whose numbers are too small for comparison, it will be noticed that the Angoni, who may be considered comparatively recent immigrants to this area, show a far smaller percentage of old cases than the other tribes, amongst which there is but little difference; and that the percentage of old cases amongst children is only 25 per cent. less than in adults, which is in accord with the replies received as to age at onset, the average of 469 cases being 11 years The ages of 57 cases with actual granulomata was also estimated and the average of these worked out to 19 years, even though persons as old as 57 years were included; finally, the percentage of old cases amongst men and women is almost identical.

Out of 464 cases the site of the " Mother Yaw " was 268 times the lower limb and 127 the upper limb, the remainder being on the trunk, head and neck, except two on the genitals. In the vast majority of old cases the character and position of the scars of the granulomata left little room for doubt as to the diagnosis, but of the 464 cases amongst 2,945 persons examined, in 10 only no definite scars could be found.

In 80 out of 394 old cases in men and women firm subcutaneous nodules, varying in size from that of a pea to that of a duck's egg, were found in varying parts of the body, but the favourite site for them was on the subcutaneous border of the ulna, about two inches from the tip of the olecranon process; over the great trochanter of the femur and over the ligamentum patellae and lower part of the patella were also common sites, in the latter situation being sometimes associated with enlarged prepatellar bursa; occasionally they were seen near the malleoli and in one case on the zygoma. These nodules correspond closely to the description of " Juxta-articular nodules " given in works on Tropical Medicine, the cause of which is said to be unknown.* The fact that of 394 old cases of yaws, 55 (*i.e.* 13·96 per cent.) had subcutaneous nodules on the ulna, whereas of the remaining 1,984 persons examined only eight had them, is strong evidence that these nodules are nothing more or less than a manifestation of yaws. They are comparable to gummata but have not the tendency of the latter to break down.

*** The works to which Dr. Davey has access are apparently not recent. Juxta-articular nodules are usually attributed to a fungus, a species of Nocardia.—[ED.]**

TABLE III.—Showing Incidence of Yaws in Dedza District, Nyasaland.

Tribe.	No. of men examined.	No. of recent cases.	Percentage.	No. of old cases.	Percentage.	No. of women examined.	No. of recent cases.	Percentage.	No. of old cases.	Percentage.	No. of children examined.	No. of recent cases.	Percentage.	No. of old cases.	Percentage.	No. of infants examined.	No. of recent cases.	Percentage.
Yao ..	427	3	0·70	92	21·55	662	11	1·66	135	20 39	276	7	2·54	39	14·13	181	0	—
Angoni ..	244	8	3·28	12	4·92	350	5	1·43	16	4·57	94	1	1·06	1	1·06	120	0	—
Anyanja	193	2	1·04	35	18·19	273	6	2·19	45	16·48	142	7	4·93	17	11·97	65	1	1·54
Amalawi...	8	1	—	3	—	35	6	—	12	—	4	0	—	0	—	15	3	—
Achipeta..	92	0	—	18	19·57	94	1	1·06	26	27·66	51	0	—	13	25·49	19	0	—
Total ..	964	14	1·45	160	16·6	1414	29	2·05	234	16·55	567	15	2·46	70	12·35	400	4	1·0

Further observations by the author in the Mlanje District tend to confirm the yaws theory of the origin of juxta-articular nodules, an opinion which was previously advanced by MOUCHET and DUBOIS [see this *Bulletin*, Vol. 1, p. 530].

"There is a curious legend about the origin of yaws in this district, where it is said to be a comparatively recent introduction. Two generations ago a man went out fishing on the lake in the afternoon; a very strong wind arose and he was compelled to stay out all night on some rocks. When he left his village he was healthy, but he returned next day covered with yaws and introduced the disease into the district. It is supposed that an evil vapour in the lake caused the yaws. This idea may have been suggested by the appearance of the little masses of rock whitened by guano, which bear no small resemblance to a crop of yaws."

The author's conclusions are as follows:—

"1. Yaws is endemic in the low lying area of the Dedza District adjoining the lake: about 16·5 per cent. of adults have suffered from the diasese.

"2. Males and females are affected in equal proportions.

"3. A large amount of temporary and a not inconsiderable amount of permanent disablement is due to the disease and its after effects.

"4. In about half the cases the disease is acquired before adult life is reached, and it is probably a potent factor in infant mortality.

"5. 'Juxta-articular Nodules' are a late manifestation of yaws.

"6. Gangosa (Rhinopharyngitis Mutilans) probably occurs in Dedza District, but the observations recorded throw no light on its connection with yaws."

E. Hindle.

HOWARD (R.). **The Importance of Tertiary Yaws.**—*Jl. Trop. Med. & Hyg.* 1915. Feb. 1. Vol. 18. No. 3. pp. 25–27.

The author has worked for over fifteen years in different parts of Central Africa, between Lake Nyasa and the East Coast in the neighbourhood of Zanzibar. In this paper he calls attention to the frequency of tertiary yaws and points out that this is liable to be mistaken for tertiary syphilis, so that travellers' statements to the effect that the natives are riddled with the latter disease should be received with caution. In many parts of Central Africa nearly 50 per cent of the population have suffered from yaws. Two parts of German East Africa, viz., the Bondé country, 30 miles inland from Tanga, and the region of Newala, 90 miles inland from Lindi, were found to be badly infested with yaws. In the former district the disease seemed to have existed for a long time, but in the latter it seems to be of much more recent introduction assuming almost an epidemic character. In the course of two years over 2,000 cases attended the Mission Hospital for treatment, and a large proportion of them healed under potassium iodide. Left untreated in a native community, primary yaws heals in about a year, but tertiary yaws often steadily advances causing frightful deformities. Rhinopharyngitis mutilans and a special form of leucoderma of the palms and soles are in many instances symptoms of the disease and the author adds notes on these conditions.

E. H.

RINGENBACH (J.) & GUYOMARC'H. **La Lèpre et le Pian dans les Territoires parcourus par la Section française de la Mission de Délimitation Afrique Equatoriale française-Cameroun en 1912–1913.**—*Bull. Soc. Path. Exot.* 1915. Mar. Vol. 8. No. 3. pp. 124–130.

Yaws (*Okon Mabara* among the Pahouins, *Mobaka* in the Yassouas, Yakingas and Indongoes, *Manfouta* in the Boca-Bongas) was found to be common in all the districts visited by the authors. It was especially prevalent amongst children and adolescents. For example in the village of Kata N'Goye there were nineteen patients with yaws, fifteen of which were children. It is also common for all the members of one family to be infected.

The lesions were especially common on the face and in the neighbourhood of the natural orifices of the body. In addition the soles of the feet were sometimes affected and this form of lesion was most difficult to cure.

From the Sangha to the Ibenga the natives employ the same method of treating this disease; it consists in first washing the lesions with warm water and then applying the chopped up young leaves of a shrub (Tingouka among the Yassouas, Lingouka of the Yakingas and Indongos, Manfouta of the Boca Bongas); this plant seems to possess caustic properties and almost invariably cures the patient after one to three months.

The authors obtained good results by painting the lesions twice a day with a 1 in 10 solution of chromic acid, and in many cases the patients were cured within a fortnight.

The authors administered intravenous injections of salvarsan on six occasions but were unable to find out the results of the treatment. The drug was made up in solution before leaving France and the authors state that in this case it is possible to administer injections in the bush.

E. H.

BAHR (Philip H.). **Notes on Yaws in Ceylon, with Special Reference to its Distribution in that Island and its Tertiary Manifestation.**—*Ann. Trop. Med. & Parasit.* 1915. Jan. 29. Vol. 8. No. 4. pp. 675–682. With 1 plate.

The author presents certain aspects of the epidemiology and clinical symptoms of yaws as it occurs in Ceylon. Though widespread in certain clearly defined areas it has a topographical distribution, and cases of yaws in which the original infection was contracted at an elevation of 800 or more feet above sea-level are extremely rare. It is especially prevalent in the Northern and Eastern Provinces and also in the hot damp villages of the Southern Province, whilst in the comparatively cool up-country planting districts the disease appears to be unknown though syphilis is common enough. From various observations the author is of the opinion also that in Ceylon there is developed a reciprocal immunity between yaws and syphilis, for the two rarely occur side by side.

The temperature of the atmosphere seems to be the one climatic factor governing the somewhat restricted distribution of yaws in Ceylon, and the immediate environment may be disregarded as a means of disseminating the virus.

The author then speculates as to the possible mode of distribution and suggests that the causative spirochaete may circulate in the blood stream and be transmitted by some blood-sucking insect whose range is definitely limited by climatic factors or the character of the vegetation. In addition the author calls attention to some of the clinical manifestations of the disease and mentions the following:—acute and chronic periostitis, osteitis, epiphysitis, synovitis, ulceration, and gangosa. The paper is accompanied by excellent photographs of certain of these conditions.

E. H.

Castellani (Aldo). **Note on the Internal Treatment of Yaws.**—*Jl. Trop. Med. & Hyg.* 1915. Mar. 15. Vol. 18. No. 6. pp. 61–63. With 4 figs.

Although salvarsan and neosalvarsan are without doubt the specific drugs for yaws, it is often difficult to arrange for the administration of intravenous injections in out of the way districts and also many patients refuse to submit to any form of injection. For these and other reasons an internal treatment by easily obtainable drugs is much to be desired and the author gives a prescription which has given excellent results in Ceylon. The dose consists of:—

tartar emetic	1 gr.
sodii salicyl.	10 gr.
potass. iodid.	1 dr.
sodii bicarb.	15 gr.
water	1 oz.

Adults and youngsters of over fourteen years are given this dose three times daily, diluted in four times the amount of water; children of eight to fourteen years are given half doses and younger children one third or less. The active drugs in the mixture are said to be the potassium iodide and, to a much less degree, the tartar emetic. The sodium salicylate seems to hasten the disappearance of the crusts. The presence of the large amount of sodium bicarbonate seems to prevent to a great extent the symptoms of iodism and decreases the emetic properties of the mixture. The mixture was tried in eleven cases given in the above doses for ten to fifteen days, then five to ten days' rest, then another course for another five or ten or fifteen days, and satisfactory results were obtained in fairly recent cases in which the disease had started three to twelve months previously.

Photographs are given shewing the effect of this mixture in the treatment of two of these cases.

E. H.

Le Roy des Barres. **Sur l'Emploi du Galyl dans le Traitement du Pian.**—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon* (1913). 1914. pp. 429–431.

Galyl, or '1116,' was discovered by Mouneyrat at the same time as ludyl and has given excellent results in the treatment of yaws. The author found that in Annam the surface lesions of patients treated with this compound began to disappear within two days after an injection, and after a second injection no patient ever showed any relapse. There is very little general reaction following the injection and in view of its lower toxicity (and also lower price) than salvarsan and neosalvarsan, it is to be recommended for the treatment of yaws.

Some notes on this compound may be of interest. Galyl is a tetra-oxy-diphosph-amino-diarseno-benzene. It is a yellow powder, easily soluble in water, when it forms a brown solution. When kept in a stoppered bottle this solution becomes yellow after about an hour. The substance may be administered either intravenously in isotonic solution, or intramuscularly in oily suspension, but the latter is painful. For the preparation of the solution for intravenous injection the following procedure is recommended by MOUNEYRAT:—

Each capsule contains enough sodium carbonate to cause the solution of all the galyl in distilled water and an isotonic solution is prepared by dissolving 1 gm. of the mixture in 3 cc. of water. The solution is prepared aseptically by placing the necessary quantity of sterilized water in an Erlenmeyer flask and adding the powder gradually, shaking the liquid all the time to prevent the formation of clumps, which retard the solution.

The dose is 0·008 to 0·0085 gm. per kilo. body weight in the adult male and 0·007. to 0·008 in the adult female, but these doses can be increased without causing any inconvenience.

For the treatment of yaws the author practised a first intravenous injection of 0·30 gm. followed by a second of 0·40 gm., the interval between the injections being about eight days. The best time for giving the injection is before breakfast and, if no reaction is produced, the patient can eat without any inconvenience after four or five hours. Occasionally a slight reaction is produced. but as a rule the tolerance is perfect and the patient is merely confined to his room for a few hours.

E. H.

MCDONALD (W.). **Treatment of Yaws by Intramuscular Injections of Salvarsan.**—M.S. Report to the Colonial Office from the Governor of the Leeward Islands. Received April 26, 1915.

Up to the end of December, 1914, the writer treated 286 cases of yaws at the Holberton Hospital, Antigua, by intramuscular injections of salvarsan. In all patients over 14 years of age the full dose (0·6 gm.) was employed; from 4 to 14 years, 0·4 gm., and under four years old, 0·2 gm. The patients were kept in hospital for only three days after the injection and if all right were then sent home to complete the cure. In only one case was it necessary to administer a second injection. In a few patients necrosis occurred at the site of the injection and the necrotic tissue had to be removed.

The author then goes on to compare his method of sending the patients home after three days, with that employed in other hospitals of the West Indies, where the patients are generally kept in hospital until the cure has been completed, an average duration of 21 days. The writer's method enables a larger number of patients to be treated and is very economical, since there is no necessity for a special Yaws Hospital and also the cost of feeding is of course very much less.

In conclusion the writer recommends that the last case in the Island should be hunted up and treated, which will necessitate an efficient medical examination of all school children and infants. Also any cases of yaws from neighbouring islands should be refused admission unless they submit to treatment at the hospital.

E. H.

OZZARD (A. T.). **The Treatment of Yaws by Neosalvarsan.**—*Brit. Guiana Med. Ann. for 1913.* pp. 99–100. With 4 plates. 1914. Letchworth: Garden City Press.

The author has obtained excellent results at Georgetown in the treatment of cases of yaws by means of intravenous injections of salvarsan and neosalvarsan. Four photographs accompany the article and show two typical yaw cases before and after treatment with neosalvarsan.

E. H.

WOOD (Edward J.). **The Occurrence of Yaws in the United States.** – *Amer. Jl. Trop. Dis. & Prevent. Med.* 1915. Jan. Vol. 2. No. 7. pp. 431–449. With 1 plate.

The author has endeavoured to mention every case of yaws that has been reported in the United States, and in addition adds notes on the history, diagnosis and symptoms of the disease. The paper contains nothing new beyond the record of what seems to have been a case of yaws occurring in North Carolina in a white child born of parents who had never been out of that State.

E. H.

PELLAGRA.

SAMBON (L.). **Report upon Pellagra in the West Indies.** [Received in Colonial Office 9th February, 1915.]

The author calls this paper of 19 pages a short preliminary report, which is to be followed by an extended one. Mention is made of the views of the author and of those in the United States who believe that a parasitic origin of pellagra is likely to prove the correct theory. During the last three months of 1913 the author visited the islands of Jamaica, Dominica, St. Lucia, St. Vincent, Barbados, Grenada and Trinidad, the colony of British Guiana and the Isthmus of Panama, and in all these places he either saw cases of indigenous pellagra, or was informed of their occurrence by the local health officers. In Jamaica and Barbados the disease is said to have been known and correctly diagnosed as early as 1898. In the latter island pellagra has often been confused with sprue and our author now wishes to claim that the disease described by HILLARY there in 1766, and called by him "Aphthoides Chronica" was just as likely to have been pellagra as sprue, though he acknowledges that HILLARY'S description has been always accepted as sprue. Under the heading "Pellagra and Sprue—are they identical?" he says "My knowledge of sprue being based almost entirely upon the very unsatisfactory literature of the disease, I do not feel justified in expressing any very definite opinion upon the matter; the two diseases are, in many ways, remarkably alike, yet they appear to be distinct."

He is quite certain that the pellagra of the West Indies differs in no way from the pellagra seen in Europe and America. But he quite correctly points out that the complications and concomitant diseases of pellagra differ considerably in various countries and thus seem to alter the features of the disease.

In the West Indies pellagra may be associated with syphilis, tuberculosis, gonorrhoea, dysentery, ankylostomiasis, yaws, dhobie itch, vitiligo, ichthyosis, gangrene and ulcerative granuloma of the pudenda. A discursive paper is concluded with the suggestion that "many cases of St. Anthony's fire, occurring in Spain and other countries from the tenth to the eighteenth century, were neither erysipelas nor ergotism, but gangrenous pellagra."

F. M. Sandwith.

McDONALD (W. M.). **Pellagra in Antigua.**—*Lancet.* 1915. Jan. 16. pp. 127-128.

Pellagra was first reported in this island in 1909 and is now recognised as being endemic there. The author met during 1913 with 32 cases at the lunatic asylum and hospital, of which at least 21 originated in Antigua, and 11 died. No cases have so far been reported among the white population; all cases occur among blacks who live chiefly on maize and salt fish. The author rejects the Simulium and the Stomoxys theories and believes that pellagra in Antigua "is caused not by bad food but by deficient food."

He has not been able to find any evidence that the disease is communicable from person to person.

F. M. S.

SILER (J. F.), GARRISON (P. E.) & MACNEAL (W. J.). With the collaboration of H. D. SINGER, P. A. SCHULE, O. S. HILLMAN and others. **Pellagra II. Second Progress Report of the Thompson-McFadden Pellagra Commission of the New York Post-Graduate Medical School and Hospital.**—iv.+169 pp.

Many of the papers in this carefully compiled report have been separately published and were reviewed in this *Bulletin*, Vol. 5, No. 1. Other papers are now reviewed in this number. The authors seem to be quite clear that there is no evidence to connect Simulium with pellagra. They carefully consider the theory that a deficiency in some special dietary constituent may cause pellagra, but they are unable to accept this theory entirely as may be seen from their conclusions:—

"1. Pellagra spread from a pre-existing case as a center in the six villages here studied.

"2. It was transmitted to new victims only through very short distances and chiefly to those immediately associated in the home with a pre-existing case of the disease.

"3. Frequent use of corn-meal as an article of diet was not a factor in the causation of pellagra in these villages.

"4. There was discovered no evidence that canned goods have anything to do with the causation of pellagra.

"5. Frequent use, even daily use, of fresh meats and of eggs afforded no relative protection from pellagra in these villages.

"6. The daily use of milk seemed to diminish to some extent the danger of contracting pellagra in these mill villages in 1912 and 1913, although its use did not fully insure against the development of the disease."

F. M. S.

JENNINGS (Allan H.). **Summary of Two Years' Study of Insects in Relation to Pellagra.**—*Jl. of Parasitology.* 1914. Sept. Vol. 1. No. 1. pp. 10–21.

The author is one of the staff of the United States Government Bureau of Entomology, and this paper is chiefly based upon his work in cooperation with the Thompson-McFadden Commission in 1912–1913. His conclusions are as follows:—

"Our studies have led us to believe that ticks, bed-bugs, mosquitoes, fleas, horseflies, and, in the absence of further and more incriminating evidence, the lice, may be dismissed from consideration as transmitters of pellagra; that there is not only insufficient evidence to incriminate flies of the genus *Simulium*, but much evidence directly opposed to such incrimination and that the biting stable-fly, *Stomoxys calcitrans*, shows in marked degree those characteristics of distribution, habit and association with man which would pre-eminently fit it to be the vector of pellagra if transmission of the disease by a blood-sucking insect is shown to be possible.

"If pellagra is found to be an intestinal disease of bacterial origin, house-flies and others of similar habits will in all probability be found to be an active factor in its causation."

F. M. S.

PAGE (B. W.). i. **Etiology of Pellagra.**—*Med. Record.* 1915. Jan. 2. Vol. 87. No. 1. Whole No. 2304. p. 22.
ii. **Etiology and Treatment of Pellagra.**—*Southern Med. Jl.* 1915. Feb. Vol. 8. No. 2. pp. 116–117.
iii. **The Use of a Microscope in the Diagnosis of Pellagra.**—*Amer. Jl. Public Health.* 1915. Jan. Vol. 5. No. 1. pp. 57–58.

Writing from Lumberton, North Carolina, the author claims in these three papers to have discovered a " bacillus which may be the cause of pellagra." It is said to have been present in large numbers in the contents of the large intestine of 53 pellagrins, and it " has not been seen on examination of healthy individuals and those suffering from other diseases." " It is motile, aerobic, sporogenous, stains readily and grows on culture media."

Only " mild intestinal affection was produced in a cat," but in a man pellagra is said to have been induced by transference of cultures of the bacilli. The man suffered, we are told, from pharyngitis and bronchitis within three days, followed by definite intestinal and nervous symptoms of pellagra, whereupon " the microscope revealed the organism in its many forms." These forms are said to be spore, spirillum and bacillus.

F. M. S.

SANDERS (T. E.). **The Organism probably causing Pellagra.**—*Southern Med. Jl.* 1915. Mar. Vol. 8. No. 3. pp. 207–208.

The author found in the spinal fluid of two pellagra corpses in Arkansas an organism which he now believes to be identical with that described by Dr. B. W. PAGE. Dr. Sanders found the same organism in the spleen of a third case, and also in the faeces of several pellagrins suffering from diarrhoea.

F. M. S.

BLOSSER (Roy). **Some Observations further incriminating Sugar-Cane Products as the Main Cause of Pellagra in the South.**—*Southern Med. Jl.* 1915. Jan. Vol. 8. No. 1. pp. 33-36.

This author has written three previous papers upon this subject. He believes that pellagra may be due to a one-sided diet and he has great faith in administering three drops, gradually reduced, of " fluid extract of gelsemium, T.I.D."

His claim that sugar is responsible is based upon the following conclusions :—

" (1) All but three of the 133 pellagrins whom I have questioned admit having eaten sugar-cane products very freely.

" (2) Exclusion of all partially refined sugars and sugar-cane syrups from the diet of pellagrins has enabled us to cure 121 out of 133 cases treated ; of the remaining 12, eight were improved and four died, a mortality of 3 per cent.

" (3) Recurrences have not occurred in any cases in which the diet was carried out as directed ; slight recurrences developed in five cases, but in each of these it was found that the patients had previously relapsed into their former diet."

F. M. S.

Clark (H. C.). **Observations in Tropical Pathology. 1. A Brief Analysis of Thirty-Seven Fatal Cases in which Pellagra has been pointed out alone or in Association with other Diseases.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1914. Dec. Vol. 2. No. 6. pp. 378–408.

This is an analysis of 37 cases diagnosed as pellagra, taken from 4,020 post-mortem records. Thirteen of the cases were negroes from Jamaica, besides seven from Barbados.

The author from a survey of the clinical notes and the post-mortem findings accepts 12 of the 37 cases as certainly positive, and seven others as doubtful.

The accepted cases varied in age from 21 to 76, and it is significantly pointed out that none occurred among the children. "Nearly all the individuals were either employed as housewives, domestics or in some public building, save for a few outdoor labourers." The diet of the individuals consisted chiefly of vegetables, fruit and fish; the fish taking the place of the meat usually eaten by other races on the Panama Isthmus.

The chief diseases found in association with pellagra were "syphilis, excessive chronic alcoholism, arteriosclerosis, starvation, chronic pelvic inflammations and various types of chronic intestinal inflammations."

[In very few cases were the brain or spinal cord examined microscopically.]

F. M. S.

Ciarla (Ernesto). **Il Problema Etiologico della Pellagra alla Luce della Nuova Dottrina sulla Amerositosi.** [The Etiological Problem of Pellagra by the Light of the new Doctrine of Unilateral Nutrition.] *Riv. Pellagrolog. Ital.* 1915. Mar. Vol. 15. No. 2. pp. 18-21.

This paper begins with an elementary treatise on deficiency of nutrition and it is suggested that "merositina" is a preferable word to vitamine. The rice experiments producing polyneuritis gallinarum are briefly mentioned, and also scorbutic symptoms occurring in guinea-pigs which have been fed exclusively on dried food without fresh vegetables. The writer argues by analogy that pellagra may be due to a one sided diet and should be prevented by improving and varying the food consumed by peasants. He writes from a pellagrous centre near Milan.

F. M. S.

Singer (H. Douglas). **Mental and Nervous Disorders associated with Pellagra.**—*Arch. Intern. Med.* 1915. Jan. 15. Vol. 15. No. 1. pp. 121–146.

This paper forms a part of the Second Progress Report of the Thompson-McFadden Pellagra Commission and is the result of the examination of 164 unselected cases. The author seems to accept the general idea that pellagra is especially a disease of the nervous system, and also that the "disease is extremely frequent among the chronic insane, most of whom represent late stages of the dementia praecox personality." Curiously enough he has not so far seen pellagrins of the general paralytic type. His general conclusions are as follows:—

"1. Mental disturbance occurs in about 40 per cent. of all cases of pellagra. Such disturbances are more frequent with repeated attacks. Children are practically exempt. They are most common in men between 21 and 40, and women about 41 to 60.

"2. About 95 per cent. of the mental disorders are the direct result of the pellagrous intoxications, and although the mortality in such cases is much higher than in cases without such disorder, yet the mental disturbance will fully recover if the patient survives. They correspond to similar disturbances in other somatic diseases and in such case are often described as not 'insanity.' The remaining 5 per cent. are examples of mental disorder primarily dependent on the individual's make-up. or else are merely concomitant.

"3. Faulty nervous organization, including inadequate mental adaptability, seems to be associated with a predisposition to pellagra. This seems to afford the most satisfactory, even if only partial, explanation of the extraordinary frequency of pellagra arising among the insane, the increased frequency of functional psychoses and psychoneuroses and of nervous disease of the congenital anomaly type among pellagrins as compared with more normal individuals.

"4. Chronic 'insanity' due strictly to pellagrous intoxication, if it occurs, is rare.

"5. Chronic nervous disease as the result of pellagra, if it occurs, is exceptional."

F. M. S.

VERGA [Ercole). **Note Pellagrologiche. Localizzazione non Comune dell' Eritema Pellagroso. Onicogrifosi in Soggetti Pellagrosi.** [An Uncommon Site for Pellagrous Erythema. Affection of the Nails in Pellagrins.]—*Riv. Pellagrolog. Ital.* 1915. Jan. Vol. 15. No. 1. pp. 1–5.

The author cites several writers who have stated ever since the days of Gaspare CASAL that the pellagrous rash usually spares the palms of the hands and the nails and distal phalanges of both hands and feet. But he has found that some of the chronic pellagrins in his lunatic asylum may have an erythema of at least one palm and that 18 per cent. of 50 lunatics had decided affection of the finger nails, while 24 per cent. had similar "dystrophy" of the toe nails.

F. M. S.

FRAZER (Thompson). **The Dermatitis of Pellagra.**—*Jl. Cutan. Dis. including Syph.* 1915. Apr. Vol. 33. No. 4. (Whole No. 391). pp. 311–312.

This is a brief note, accompanying three photographs of early eruptions in their first attack. The author hopes that dermatologists and others may find them useful in throwing light upon otherwise obscure cases of dyspepsia, diarrhoea or neurasthenia.

F. M. S.

Greil (Gaston J.). **Pellagra in Children, with Preliminary Report of Cases in Montgomery, Ala.**—*Southern Med. Jl.* 1915. Jan. Vol. 8. No. 1. pp. 29–33. With 5 figs.

A record of six cases selected from 32 pellagrous children who have been under the author's care at two dispensaries in factory districts. The 32 cases ranged in age from two to twelve years, and are said to have presented well-marked symmetrical skin lesions. [This would not be suspected from the bad reproductions of the photographs.] All the cases improved after better food, aided by arsenic in gradually increasing doses. Nearly all the 32 patients suffered also from hookworm disease (uncinariasis).

F. M. S.

de Probizer (Guido). **Einige praktische Bemerkungen über einen Fall von pellagrösem Erythem.** [Some Practical Remarks on a Case of Pellagrous Erythema.]—*Dermatol. Woch.* 1914. Oct. 24. Vol. 59. No. 43. pp. 1207–1212. With 2 text figs.

Writing from the Rovereto pellagra asylum, the author comments upon Professor Mense's statement that patients already suffering from seborrhoea are more likely to be attacked by pellagrous erythema than other patients. The case quoted is that of a girl with ordinary pellagrous symptoms after eating maize, who also had eczema of the external genitals and leucorrhoea. The author considers that light will be thrown upon obscure problems by publishing notes of all cases.

F. M. S.

Beeson (Carles F.). **The Thyroid Gland in Pellagra.**—*Jl. Amer. Med. Assoc.* 1914. Dec. 12. Vol. 63. No. 24. p. 2129.

The author, in North Mexico, found that in a woman of 45 years the thyroid gland increased in size when pellagrous symptoms were pronounced, and diminished when the symptoms were less evident. He asks whether this is an accidental or a causative phenomenon.

F. M. S.

Volpino (G.) & Bordoni (E. F.). **Sopra il Nostro Metodo di Terapia Eziologica della Pellagra.**—*Riv. Pellagrolog. Ital.* 1915. Mar. Vol. 15. No. 2. pp. 21–23, *&* *Pathologica.* 1915. Mar. 15. Vol. 7. No. 153. pp. 130–131.

This is a report of another case from Turin which improved after four months subcutaneous injections of an aqueous extract of maize. It is also reported that the previous cases published have remained fairly well.

F. M. S.

DE ANGELIS (Giovanni). **Sulla Presenza dello Streptobacillus pellagrae (T) nelle deiezioni di Pellagrosi.** [The Presence of the Streptobacillus of Pellagra in the Faeces.]—*Malaria e Malat. d. Paesi Caldi.* 1915. Jan.-Feb. Vol. 6. No. 1. pp. 27–33; Mar.-Apr. No. 2. pp. 57–77.

This paper is written from Professor TIZZONI's laboratory in Bologna by one of his assistants and is based on the examination of two patients. One guineapig died with diarrhoea, emaciation and spastic paralysis, 43 days after some dilute faeces from a pellagrin were introduced into the stomach by a catheter, while a second guineapig died with diarrhoea and loss of weight, 34 days after it had been similarly treated with faeces from the first guineapig. The author's conclusions briefly are: that it is possible to find in the faeces of a pellagrin the same micro-organism which can be found in his blood, that this can be passed through guineapigs and can also be cultivated on gelatine. Although he agrees with TIZZONI that the micro-organism adopts great variation of form in the blood, according to the various phases of the patients' condition, he finds that only one of these forms is present in the faeces, as shown by some good photographs.

F. M. S.

TIZZONI (Guido). **Per la Dimostrazione nel Sangue dei Pellagrosi dello Streptobacillus pellagrae. Nota di Tecnica Batteriologica.** [The Demonstration of the Streptobacillus of Pellagra (Tizzoni) in the Blood of Pellagrins.]—*Riv. Pellagrolog. Ital.* 1915. Jan. Vol. 15. No. 1. pp. 6–9. With 2 figs.

The Professor suggests that the failure of so many other workers to find this streptobacillus is because it is essential that the pellagrous blood shall be absolutely sterile. He therefore gives careful instructions how the blood is to be drawn from a vein at the bend of the elbow and says that it is necessary to sterilize the skin, not only by cleanliness but also by making use of tincture of iodine. The two engravings show the flasks, connected by sterilized rubber tubing, in which the blood is cultured with veal or horse broth. He quotes the result of some experiments made in Russia in 1914 which he claims as somewhat confirmatory of his discovery.

F. M. S.

HILLMAN (Oliver S.) & SCHULE (Paul A.). **Further Observations on the Blood Count in Pellagra.**—*Arch. Intern. Med.* 1915. Jan. Vol. 15. No. 1. pp. 147–149.

This is a paper from New York in continuation of one by Dr. Hillman which was reviewed in this *Bulletin* [Vol. 3. p. 310].

A table is given of the differential leucocyte counts of 46 pellagrins from Spartanburg County, who were investigated by the Thompson-McFadden Pellagra Commission in 1913. Lymphocytosis is the predominant feature, but the non-pellagrins in pellagrous regions are also found by the authors to have a moderate relative lymphocytosis, occasioned probably by a general debility, or by some mild gastro-intestinal disturbance. The average age of the patients was 35 years. The average blood count gave 58·8 polymorphonuclears, 34·5 lymphocytes, with little cytoplasm, 2·2 large mononuclears, 1·1 transitionals, 2·8 eosinophils and 0·8 basophils. The authors do not agree that pellagra is associated with a relative increase of large mononuclear leucocytes ; their figures ranged from 0·50 to 7·20.

F. M. S.

RAMOINO (Paolo). **Contributo allo Studio delle Alimentazioni incomplete. Nota III. Ricerche sulle Alimentazioni Frugivore.**—*Pathologica.* 1915. Apr. 1. Vol. 7. No. 154. pp. 158–161.

The author has experimented on different series of seven or eight guineapigs, fed on maize, rice or wheat flour. All the animals lost weight and eventually died. Those fed entirely on maize lived 31 days while those partially on maize lived only 13 days. Those fed entirely on rice lived 40 days, and 10 days when partially fed on rice. Those which lived entirely on wheat lived longest, 45 days, while those fed on an incomplete wheat diet lived 14 days. In spite of these unlooked for results the author still believes in the "vitamine" theory.

F. M. S.

FIDANZA (F.). **Sugli Effetti dell'Alimentazione Umana con Prodotti Maidici.** [The Results of Feeding Men on Maize.]—*Ann. d'Igiene Sperimentale.* 1914. Vol. 24. (N. Ser.). No. 3. pp. 507–517.

The author experimented on two men, a peasant who had eaten maize all his life, and a servant, aged 32, who is said never to have made use of maize food. Careful measurement was made of faeces and urine, when they were subjected to maize diet and to ordinary diet, and it was found that more uric acid and nitrogen were eliminated while on an exclusive maize diet. The writer is convinced that maize has less nitrogenous value than wheat.

F. M. S.

MISCELLANEOUS.

TODD (John L). **Tick Paralysis.**—*Jl. of Parasitology.* 1914. Dec. Vol. 1. No. 2. pp. 55–64.

The author notes that the symptoms of this disease suggest infantile paralysis, but that in no instance has tick paralysis left permanent disability. He gives details of several cases recently reported from British Columbia and Montana, which show that an elevated temperature, rapid pulse and respiration and other constitutional symptoms are not infrequent. A series of experiments was made with the object of producing paralysis in laboratory animals by the bites of ticks. The technique is described. Three monkeys, seven lambs, a guineapig and three puppies were employed, and numerous *Dermacentor venustus.* In many cases the tick became engorged but paralysis never occurred, though some of the ticks had been taken from cases of the disease. Experiments were also made to see whether an extract capable of producing paralysis in laboratory animals could be obtained from the bodies of the ticks. Ticks were ground up in a solution of glycerine or normal saline; the mixture was shaken and filtered and the filtrate was introduced into rats and in one instance a lamb (five experiments); paralysis never followed. Other experiments were made to ascertain whether an anti-coagulin existed in the filtrate of extracted ticks. It is concluded that :—

"The paralysis of children is not infrequently accompanied by elevation of temperature and by other constitutional symptoms; it is possible that symptoms resembling those observed in children sometimes may appear in adults who have been bitten by ticks.

"Under experimental conditions by no means every tick bite produces paralysis in laboratory animals.

"A weak extract of ticks will not cause paralysis when injected into white rats, even though it possesses definite power to prevent the coagulation of blood."

A. G. B.

STRICKLAND (C.). **Note on a Case of "Tick-Paralysis" in Australia.**—*Parasitology.* 1915. Mar. Vol. 7. No. 4. p. 379.

A boy of eleven got a tick in his ear while in the bush. Four days later he felt sick and giddy; later he could not walk without assistance and his face was on one side. The tick was removed and ten days later the child was well. The tick was not identified. NUTTALL writes that this may well have been a case of tick paralysis.

A. G. B.

SEHEULT (R.). **Note on a Case of Goundou.**—*Lancet.* 1915. Jan. 9. p. 72.

The patient was a negro girl who came to Trinidad from Tobago at the age of four. A small swelling was noticed on both sides of the child's nose four years later, three years before she was seen by the author. No history of yaws or syphilis could be obtained. Both tibiae were distinctly thickened. The author says that this is the first case of goundou he has met with in twenty years' practice in Trinidad. The disease has been reported by STRACHAN in a Jamaican child. Yaws is prevalent in Tobago.

A. G. B.

MCCARRISON (R,). **The Distribution of Goitre in India.**—*Indian Jl. Med. Research.* 1915. Jan. Vol. 2. No. 3. pp. 778–790. With a map.

The author has collected details of the prevalence and distribution of goitre in almost every part of British India, with the object of throwing light upon the etiology of the disease. The distribution is set forth in a spot map. It is seen that goitre is widely prevalent over the whole of Himalayan and Sub-Himalayan India, and extends plainwards on the west as far as the junction of the Indus with the Sutlej and on the east as far as the junction of the Ganges with the Brahmaputra. South of the Sutlej and the Ganges the disease occurs much more sparsely. The author notes, again, that it is excessively common in those parts of India drained by the great Indian rivers, the Ganges, the Brahmaputra and their tributaries, as well as in the northern part of Burma drained by the Irrawaddy and the Salween.

While goitre is found in many of the mountainous parts of India it is not present in all, nor does it prevail with equal intensity in every inhabited part of a given range in which it is endemic. It is extensively distributed in the plains. It prevails at an altitude from 10,000 feet downwards. A consideration of its geological distribution shows that it chiefly occurs on rocks of the post-tertiary and archaean groups. There appears to be little connection between the rainfall and the prevalence of goitre, but the disease is believed most commonly to commence and most rapidly to develop during or after the rains. The author suggests that this may be due to inundation, contamination of drinking water by surface washings, etc.

Goitre is most prevalent in regions "where the mean annual temperature is the lowest recorded for the whole of India, that is to say, where this temperature does not rise above 77·5° F." It is almost unknown in the hottest parts of the peninsula. The disease is well-known to prevail with the greatest intensity in temperate and sub-tropical climates. The author is inclined to attach considerable importance to atmospheric temperature. The marked association with rivers is very striking; it is chiefly the case with those in the north of India, but is true to a less degree of many of the smaller rivers of the southern part. The disease is believed to show a tendency to progress along the course of canals.

In the part of Bihar and Orissa traversed by the Ganges, reports are unanimous that north of the river goitre is very rife, while south of the river it is very sparingly met with. Reasons for this are discussed. It is stated that north of the Ganges the prevalence of goitre is facilitated by several factors—the water-logged state of the country, the insanitary state of the villages and the greater area under wet crops. These conditions do not obtain in the area south of the Ganges. "Swampy, sodden lands, where the soil and water contain much organic matter, of human or animal origin, provide the ideal conditions for the development of goitre." The incidence of the disease is chiefly among the poorest and lowest class of India and in cultivators of the soil. It is much more prevalent in rural than in urban districts. The distribution in goitrous localities is strikingly unequal. The author says that goitre appears to be more common in animals living in swamps of the Gangetic plains than elsewhere. It is very rare in children under eight and is much more common in women than men.

Reports have been received from several districts stating that the waters of certain wells are notorious for their supposed goitre producing properties. Other waters are reported to be capable of curing goitre. Some of these have been analysed and found to contain iodine. The author believes that these waters possess the curative properties attributed to them. He recalls that the addition of small quantities of iodine to the water in which trout suffering from thyroid hyperplasia are living is sufficient to cause a very rapid disappearance of the hyperplasia (GAYLORD). He himself holds that the action of iodine is due to its germicidal properties rather than to any effect on metabolism. All research has demonstrated, he writes, that no known chemical ingredient of water is capable of causing the disease.

A. G. B.

i. FRICKS (L. D.). **Rocky Mountain Spotted Fever. A Report of its Investigation and of Measures undertaken for its Eradication during 1914.**—*U. S. Public Health Rep.* 1915. Jan. 15. Vol. 30. No. 3. pp. 148–165. With 3 maps.

ii. COOLEY (R. A.). **The Spotted Fever Tick** (*Dermacentor venustus* **Banks) and its Control in the Bitter Root Valley, Montana—A Review.**—*Jl. Econom. Entomol.* 1915. Feb. Vol. 8. No. 1. pp. 47–53.

i. This Report is mainly concerned with (1) measures for the control and eradication of the disease in the Bitter Root Valley, Montana, and (2) a study of its distribution.

It is noted that the inhabitants now generally avoid the woods and uncultivated ground during the tick season or protect themselves if they have to go there. This must not be lost sight of in estimating the effect of the tick eradicative measures. These comprise :—

"(1) The reclamation and cultivation of arable land.

"(2) The burning over of the foothills.

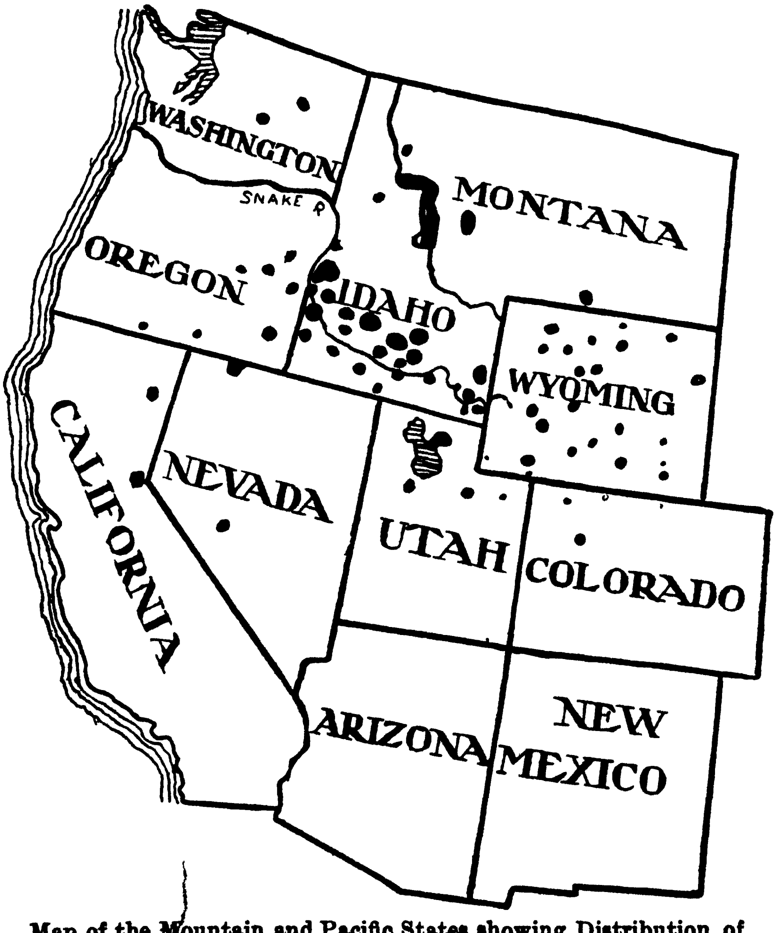
"(3) The killing of wild animals.

"(4) Hand picking and the dipping of domestic animals in arsenical dips.

"(5) Sheep grazing."

During 1914 carbon bisulphide pumps were extensively used for the destruction of ground squirrels. The destruction of small wild animals in conjunction with other eradicative measures seems to have had a marked effect. At the beginning of the season three dipping vats were in operation. Horses, cattle, and sheep were dipped in arsenical solution every ten to fourteen days, a total of 2,615 animals between April and June. Observations show that dipping alone is insufficient to eradicate the wood tick. Sheep grazing is discussed at some length. Its advantage is that no great labour or expense is entailed as in the case of the other measures. Flocks of a thousand and five hundred sheep were used. They were searched frequently for ticks, and it was estimated that 25,000 were destroyed during the season, more than 50 times the number destroyed by the dippings. "It is believed that this experiment shows conclusively that a high percentage of the total adult tick infestation can be destroyed by sheep grazing in one season," but the author goes on to show that the conditions are specially favourable in the Bitter Root Valley and that the same does not apply to other parts with different topographical features.

The distribution of the disease as at present known is shown in the map.



Map of the Mountain and Pacific States showing Distribution of Rocky Mountain Spotted Fever.

ii. The relationship of the tick to the host in the various stages, the habits and abundance of the host animals, and the relation of the development of the tick to the succession of seasons are here reviewed.

The larvae and nymphs use very much the same mammals as hosts; practically all the small mammals occurring in the valley serve, but especially the ground squirrel, the pine squirrel and the chipmunk. The adults feed with few exceptions on large animals, that is to say, in the Bitter Root Valley, domestic animals. These facts have an important bearing on eradication. Domestic animals can be kept free of ticks by dipping and other means, and if the tick is prevented from engorging and laying eggs it must die out. The first persons who studied this tick believed that it completed its life cycle in one year. It is now shown that the life cycle is at least two years and, seeing that adults which fail to secure a host during the first season following nymphal feeding do not die but go down to the ground till July and come up again the next year to wait for a host, it is apparent that the cycle may be three years or more. These facts show that eradicative work must be very complete. It is difficult to get all owners of stock to dip; the author remarks that if spotted fever affected the animals instead of man it would apparently be less difficult to secure the owners' co-operation. He believes that squirrel destruction is desirable only in combination with dipping. The work on sheep as tick destroyers is in an experimental stage. Finally he states that bringing the spotted fever tick under complete control will require some years. Educational work among the people must be first pushed.

[A summary of our knowledge of *Dermacentor venustus* Banks is given by NUTTALL in *Parasitology,* Vol. 7, pp. 425–430. He states that the name is still *sub judice.*]

A. G. B.

BREINL (A.) & YOUNG (W. J.) **The Occurrence of Lead Poisoning amongst North Queensland Children.**—*Ann. Trop. Med. & Parasit.* 1914. Dec. 15. Vol. 8. No. 3 pp. 575–590. With 2 charts.

In 1892 attention was drawn to a disease amongst children living in the neighbourhood of Brisbane, which was attributed to lead poisoning. The symptoms in ten cases were, paralysis of the extensor muscles of the fingers, the long extensors of the toes, the tibialis anticus, and certain muscles of the thumb. Electrical examination showed a well-marked reaction of degeneration in the paralysed muscles. The blue line in the gum was only rarely seen. In four cases there was a history of gastro-intestinal seizures and constipation. In four others there were symptoms of meningitis with squint and double optic neuritis. Other cases have since been reported. The records of the Children's Hospital in Brisbane showed that in 1898 to 1903 85 cases of lead poisoning were treated as in-patients.

Within the last year the authors in Townsville have examined chemically the urine and faeces of a number of children clinically suspected to be suffering from lead poisoning; the results have proved that lead poisoning is a not uncommon occurrence among children. In the excreta of 22 children examined for the presence of lead the metal was found in 18. The cases may be classed according to the severity of the symptoms. In the very early cases there is a change in the character of the children; they become peevish and fretful; they are restless at night and lose their appetites. A history of slight pains in the epigastrium and pains in the legs can be obtained. Later the abdominal pains become more continuous and constipation is the rule; the pains in the calves become more marked and the calf muscles are very painful. The blue line is observed only in a very small percentage. Many of the cases show foot- and wrist-drop. The nerves of the legs are affected first, thus differing from the cases in adults, where drop foot is rarely present. The patients have a characteristic gait. Brain symptoms are common, "ranging from obstreperousness and fretfulness to a stage resembling mania." The body temperature is often normal throughout; the pulse rate is invariably high, as is shown in two charts. Anaemia is only marked in cases of long standing. The prognosis in the early stages is good. The complaint becomes more serious in the second and third attack; in many instances these patients remain crippled for life, in spite of careful treatment.

It is now believed that lead salts are mainly excreted in the intestine and eliminated with the faeces. The faeces were therefore examined as well as the urine; in every case a larger quantity of lead was found in the faeces, and it was often present there when no trace could be detected in the urine. The method of examination is detailed. The quantities of lead found are given in tables, the cases being classed according to the severity of the symptoms.

As to the source of the poison there is doubt. The alternatives seems to be, inhalation of dust containing lead and ingestion from the biting of finger nails. The authors remark that it is striking that cases similar to those described should not have been reported from other parts of the tropics where lead paint is employed.

A. G. B.

Zoja (L.). **Su di una forma ancora insufficientemente conosciuta di anemia acuta febbrile con itterizia ed emoglobinuria (il favismo). 1a Nota sul reperto ematologica.** [On a hitherto insufficiently known Form of Acute Febrile Anaemia with Icterus and Haemoglobinuria (Favism). Note 1, on the Haematological Findings.]—*Malaria e Malat. Paesi Caldi.* 1914. Jan.-Feb. Vol. 5. Pt. 1. pp. 2–5.

Gasbarrini (A.). **Su di una forma ancora insufficientemente conosciuta di anemia acuta febbrile con itterizia ed emoglobinuria (il favismo). 2a Nota. Ricerche Sierologiche,** [No. 2, Serological Researches].—*Ibid.* 1915. Jan.-Feb. Vol. 6. Pt. 1. pp. 1–11.

These two important papers are devoted to the discussion of a curious and but little known form of disease which occurs in Sardinia and perhaps in other Mediterranean countries. It is always attributed by the sufferers to the eating of fresh beans, either raw or cooked, or even to the scent of the flowers of the bean when in blossom. [Presumably the bean meant is the ordinary field-bean, *Vicia faba*; the species is not stated.] The disease does not occur at any other period of the year than that of the ripening of the bean, by which fact it is distinguished from black-water fever, which otherwise it much resembles in its symptoms. The patients can generally be proved by microscopical examination of the blood to be exempt from malarial infection, and have not usually been recently taking quinine, In the second of these two papers the clinical histories are given of ten cases, 7 of them being in children of ages ranging from 2 to 9 years, while the remaining 3 were in adults. Of the children four died, while all the adults recovered.

The symptoms supervene within a few hours of the ingestion of the beans, or of being exposed to the scent of the flowers, and consist of a marked and acute febrile anaemia, the number of red cells often falling to two millions per cubic millimetre, and the haemoglobin to 20 per cent. of the normal. The patient becomes icteric and severely ill. The spleen and liver are but little, if at all, enlarged but the liver may be tender to pressure. The urine contains free haemoglobin, urobilin and indican, but the serum of the blood is clear and limpid and contains no haemoglobin. There may be vomiting of bile, and the stools are bilious. Children may die in a few days, but adults usually recover, and convalescence is speedy, the blood showing evidence of rapid regeneration of the formed elements in normoblasts and megaloblasts. Deviation of complement to malarial antigen is usually quite negative. Susceptible patients may have repeated attacks of the disease.

Manifestly the symptoms of favism are clinically very similar to those of blackwater fever, but the usual antecedents of the latter affection, in the shape of malaria and medication with quinine, can be quite definitely excluded. The disease has been described by FERMI in a work published at Turin in 1905.

J. B. Nias.

BARLOW (Nathan). "**Mal de Boca**".—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1914. Oct. Vol. 2. No. 4. pp. 274–276.

The author states that tropical infectious stomatitis is recognised by the natives of Central America as a definite clinical entity under the above name. They often state that they contracted it from using the same spoon or drinking glass as a person already infected, and the author agrees that it is transmitted by direct or indirect contact. It has a wide range in Northern Mexico and cases have been seen from all parts of Honduras, Nicaragua, Guatemala, Salvador and Panama. The author regards a rather delicate spirochaete as the most probable cause. He gives the following account of the symptoms :—

> "The gums are usually first involved in the neighbourhood of the incisors. They are swollen, spongy, and very tender. Soon a whitish pellicle forms over the involved area, especially marked at the edge of the gums, where it may give the appearance of a purulent exudate. There is, however, but little secretion from the lesions—the saliva always flows abundantly. The process extends superficially much more rapidly than in depth, often attacks the cheeks and lips at the points of contact, and in advanced cases may involve the hard and soft palate, and even the tonsils. The pellicle separates later, leaving an eroded surface, which very gradually deepens. The roots of the teeth may be exposed, but the periosteum is never attacked. In advanced cases there is great debility from pain and lack of nutrition from inability to eat. There are no other constitutional symptoms. The lymphatic glands of the neck are enlarged."

He gives the points of distinction from Rigg's disease, mercurial stomatitis, noma, sprue, scurvy, thrush and tuberculosis. The condition is often found in patients who have active syphilis; it becomes worse under anti-syphilitic treatment. The milder forms recover if left to themselves; the severe form may persist indefinitely. The process is not purulent. In the severe forms it is necessary frequently to paint the entire affected area with a strong solution of an organic silver preparation, *e.g.*, 5 per cent. protargol or 40 per cent. argyrol every hour.

A. G. B.

VANDALA (P.) & AREZZI (F.). **Su Tre Casi di Bubbone Climatico a Mazarrà S. Andrea (Messina).** [On Three Cases of Climatic Bubo at Mazzara S. Andrea (Messina).]—*Malaria e Malat. d. Paesi Caldi.* 1914. Sept.-Dec. Vol. 5. No. 5–6. pp. 343–347, & *Lavori d. Soc. Ital. di Patologia Esotica.* 1914. pp. 178–183.

An account of three cases of climatic bubo in persons who had never been out of Sicily, one being an itinerant vendor of plants, the second a telegraph official, and the third the wife of the latter, who was an elementary schoolmistress. Cases of climatic bubo have been already reported by GABBI from Calabria and Sicily.

J. B. N.

LEBER (A.) & v. PROWAZEK (S.). **Chetnot manengheng hâlum-tano. (Die kalte Waldkrankheit der Chamarro.) Ein Beitrag zur vergleichenden Psychiatrie und zur Kenntnis des Amok.** [The Cold Forest-Disease of the Chamorro.]—*München. Med. Woch.* 1914. Jan. 13. Vol. 61. No. 2. pp. 60–64.

Under the above title the author describes a form of nervous disease, which is met with among the natives of the Ladrone and Marianne Islands in the Pacific. The patients would appear to be exclusively young men or boys.

The disease begins in adolescence, and is characterized by sudden attacks of unconsciousness, which often come on out-of-doors when the patient is at work, and are therefore attributed by the natives to possession by spirits dwelling in the woods; hence the name of "wood-disease." The seizures last for various periods ranging from a few minutes to 12 or 24 hours, and are not as a rule, apparently, accompanied by convulsions, though they may occur. There would appear to be in many cases an aura, taking the form of figures, or perhaps of voluptuous sensations. Temporary aberrations of intellect, taking the form of delusions of persecution, are apt to follow these attacks, and the sufferer is then likely to seize an axe or other weapon, and do mischief, until secured. In the intervals the intellect remains more or less normal.

The disease has manifestly many analogies with epilepsy, and with what is described as "Amok" in Malaya. Five cases of the condition are described at length by the author, and a bibliography of works relating to the subject is appended.

J B. N.

RAFAEL RISQUEZ (Jesus). **El Bicho o Rectitis Epidémica de Venezuela.** [El Bicho, or Epidemic Rectitis].—*Gaceta Med. de Caracas.* 1914. July 31. Vol. 21. No. 14. pp. 145–148.

The author draws the attention of Venezuelan practitioners to a disease which goes under various names, but is described by MANSON in his textbook of Tropical Diseases as *Rectitis gangrenosa epidemica.* It affects negroes chiefly and appears to have been originally imported from Africa in the time of the slave trade. The author himself has seen but one possible case of the disease, in the person of a negro girl, nine years of age. In that case the patient was in the habit of passing a large number of trichocephalus worms, and to these at the time the symptoms were attributed. Few cases of the disease come under the notice of regular practitioners in Venezuela, because it is usually capable of treatment with domestic remedies, like enemata of lemon juice or tampons of pounded ash-leaves impregnated with lemon juice. Plugging of the rectum with soot is also an approved remedy with the laity.

J. B. N.

BALFOUR (Andrew). **Tropical Problems in the New World.**—*Trans. Soc. Trop. Med. & Hyg.* 1915. Jan. Vol. 8. No. 3. pp. 75–108. With 5 plates.

This is a most interesting paper. It is discursive but seldom gets away from "tropical problems," and unlike some other valuable productions which come under the reviewer's eye it can be read in an armchair. Dr. Balfour's wanderings occupied six months, in which time he visited Barbados, Grenada, Trinidad, Ciudad Bolivar on the Orinoco, La Guaira on the Venezuelan Coast, and Caracas, Curacao, Maracaibo in the gulf of that name, Porto Colombia, the Magdalena river and Bogotá, the little known Rio Atrato, Cartagena, Colon, Jamaica, Cuba and other less well-known places.

One of the problems is the absence of anophelines, and consequently of malaria, from Barbados. Why are they not introduced by small craft from neighbouring islands? It is suggested that they board these vessels but are swept away by the wind, but Balfour evidently is dubious. A photograph of a swamp shows that the conditions for breeding are apparently good, though the natural breeding places are few. A "back-swimmer" of the genus *Notonecta* [sometimes known as water boatmen] he found to "fasten on culex and stegomyia larvae, which they grip as a spaniel grips a rabbit and then engulf tail first"; he suggests that they play a part in keeping pools free from larvae. Culex and Stegomyia abound; "it is amazing to see the lethargy and indifference with which the mosquito question is treated" by all but the medical officers.

Grenada brings Dr. Balfour to a discussion of the "Poor Whites." He describes the children as sturdy, well-nourished and good-looking, save when infected with hookworm and malaria. Tuberculosis is the chief cause of mortality in the island. At Trinidad he remarks on the apparent absence of kala azar from this island and Jamaica, though streams of East Indians pour into both colonies, and reverts to the possibility of howler monkeys (*Alouatta sinicula*) serving as carriers of yellow fever [see this *Bulletin*, Vol. 4, p. 154]. The subject is discussed at some length. It is stated that Mr. Urich, Entomologist to the Board of Agriculture, saw monkeys lying dead before the last epidemic of yellow fever in Trinidad, but did not associate the two events. It is not yet known whether the indigenous monkeys of South America are subject to the disease; Agramonte's unsuccessful inoculations were made on Old World monkeys. It is also noted that the distribution of the Alouatta corresponds fairly closely to that of yellow fever in South and Central America. Balfour suggests experimental work to test the validity of these ideas, which he believes may explain certain disease outbreaks.

A lurid picture is given of the hospital at Bogotá, 9,000 feet above the sea. It dates from 1770. "In one of its courtyards stands the dissecting room.'" "Patients lay in rows upon the floor of the wards." "All kinds of cases were mixed up, owing to lack of space, despite the protests of the medical staff." At Bogotá a photograph was obtained of a milk-can and hog wash barrel on the same donkey at the door of a hotel. In this country it is stated that sanitary conditions are well nigh non-existent. In the Cauca valley, Western Colombia, pinta of every kind and colour was exceedingly common [see paper by Strong, below].

The paper is well illustrated by a selection of the lantern slides shown, which includes a Janthinosoma carrying the eggs of *Dermatobia hominis*. They are more ventrally placed than in the illustration published in this *Bulletin* [Vol. 2, p. 528].

A. G. B.

Strong (Richard P.). **Recent Investigations in Relation to Infectious Diseases in South America.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1915. Jan. Vol. 2. No. 7. pp. 465–472.

This was a lantern slide demonstration of the results of the first expedition of the Harvard School of Tropical Medicine in 1913. The author and his colleagues, Tyzzer, Brues and Sellards first stopped at Kingston, Jamaica. They proceeded to Colon and Panama and thence to Buenaventura in Colombia on the west coast of South America, a very insanitary spot. The author writes:—

> "A large proportion of the inhabitants suffer with skin diseases, of which caraate is by far the most common. In this disease pigmented patches appear upon the skin. Sometimes these are slightly raised from the surrounding skin, at other times there is no visible elevation. The patches are usually dry and sometimes slightly roughened or even scaly. In some instances confusion with vitiligo can be avoided only by the microscopic examination of scrapings from the skin. Sometimes both vitiligo and caraate exist in the same individual. The patches in the cases observed varied in colour, being sometimes dark or steely blue, at other times black in colour. Microscopical preparations and cultures of the fungi from the skin were made in a number of these cases after partial disinfection of the skin. The cultures were never pure, and from our studies it appears that apparently several fungi may enter into the etiology of the disease which in all of its manifestations, at least, must be considered at the present time somewhat obscure. Further investigations will shortly be undertaken regarding this disease."

Apart from leprosy and syphilis three types of chronic ulceration were met with on this coast—espundia due to leishmania, phagedenic ulcer, and a third of blastomycotic origin. Thence they went to Guayaquil, with a population of 80,000, "at the present time one of the most unsanitary cities in the world." Cases of yellow fever occurred almost daily. They were "unable to detect any bodies which suggested a parasitic nature in the blood of this disease." A species of Linguatula was found in a crocodile.

From Guayaquil they went to Callao, and then to Lima. A large amount of the work of the expedition was carried on in the interior of Peru. The diseases chiefly studied were verruga peruviana, Oroya fever, and uta. Verruga they found to be due to a virus which can be transmitted to several of the lower animals (rabbits, dogs, monkeys) and produces definite skin lesions in them. The virus shows similarities to that of small-pox. No visible micro-organism could be detected. It was shown that monkeys could be immunised. In Oroya fever there are no lesions on the skin. The cause is a parasite of the red corpuscles, it is both round and rod-shaped and has received the name *Bartonella bacilliformis.* The endothelial cells of the lymphatic glands are greatly swollen and "it appears that one stage of the life cycle of the parasite is passed within these cells."

The rest of the paper deals with uta, a very old disease of Peru, due to a species of leishmania (see this *Bulletin*, Vol. 3, p. 142).

[Caraate is given by CASTELLANI and CHALMERS as a synonym of pinta, which is attributed to fungi belonging to four genera.]

A. G. B.

PETZOLDT. **Kasuistische Mitteilungen aus der Praxis.**—*Arch. f. Schiffs- u. Trop. Hyg.* 1914. Vol. 18. No. 24. pp. 811–813. With 1 text-fig.

Four cases are briefly described: a case of syphilitic chancre on the everted lower eye-lid; a case of tabes dorsalis in a leper (Lepra mutilans), with no history of syphilis; a case of tabes dorsalis in a native; and two cases of blennorhea with panophthalmitis. All the patients were natives of Ukerewe, German East Africa.

A. G. B.

DEGORCE (A.). **Contribution à l'Etude des Tumeurs chez les Annamites du Tonkin.**—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal. Saigon* (1913). 1914. pp. 432–451.

The statistics of the native hospital at Hanoi for the years 1906–1912 inclusive give 444 cases of malignant tumour among 70,649 patients, or 6·28 per mille; 299 cases were in men and 137 in women, but twice as many men as women were patients. The author proceeds to discuss the cases of tumour which he has himself seen. His conclusions are to this effect:—

> The study of tumours occuring in the Annamites has failed to reveal histological varieties which have not already been described, but the relative frequency of tumours in the various organs and regions presents some peculiarities that are worth reporting.
>
> As regards the skin, fibroma and different varieties of epithelioma are specially observed; generalised neuro-fibromatosis is fairly frequent.

Cancer of the breast is much rarer than in Europe. One is struck by the extreme rarity of epithelial tumours of the mouth, pharynx, oesophagus and intestine. Cancer of the stomach is observed much less often than in Europe and this relative rarity may be contrasted with the extreme frequency of ulcer of the stomach and of the region of the pylorus. Primary cancer of the liver is extremely common in man. Cancer of the penis is the most frequent of the cancers observed; the vulva and neck of the uterus are much more rarely attacked. Fibroma of the uterus is very rare; cysts of the ovary are frequent.

Tumours of heterotypic origin are observed fairly often in regions with a mixed embryological history; amongst others may be mentioned mixed tumours of the salivary glands and branchiomas of the neck. The orbit is the seat of tumours of which some seem to develop at the expense of the blood vessels. Goitres, developed at the expense of the thyroid body or of aberrant thyroids, are observed almost exclusively in women. The anterior lateral region of the neck is fairly frequently invaded by malignant glandular tumours of the type of lymphocytomas; these tumours have been observed only in men.

In our present ignorance of the real causes of tumours it is impossible to understand the reason of these localisations in the Annamites. Certain peculiarities may be attributed to organic predisposition peculiar to the race, to the mode of life, or to diet, but one may suppose that special parasitic infections, the nature of which is unknown to us, play an important part in the production of these tumours.

In the discussion on this paper MONTEL remarked that at Saigon (Cochin-China) malignant tumours of the mouth, lips and tongue formed 30 per cent. of such growths. Le ROY des BARRES pointed out that the difference might be due to the different manner of using tobacco. The Tonkinese smoke water pipes; the Cochin-Chinese cigarettes. Both chew betel nut and tobacco.

A. G. B.

BOBEAU (G.) **Importance des Affections Mycosiques en Cochinchine. (Note préliminaire).**—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal. Saigon* (1913). 1914. pp. 62–64.

The author in Cochin China has been struck by the number of instances in which he found pathogenic fungi in tissues obtained from the dead house or operating theatre. In his experience, in natives mycoses produce chiefly cellular or tissue lesions, leading either to tumours or loss of substance, whereas in Europeans they are found accompanying organic diseases such as liver abscess and dysentery.

In the native, pseudo-epithelioma of the penis is relatively very common. It was formerly treated by amputation, but since Bobeau's discovery of the mycotic origin the disease has yielded to iodide. Various mycoses of the skin have also been encountered.

In the case of Europeans he has found, in sections, the so-called walls of hepatic abscesses literally felted with mycelium and a similar mycelium in sections of the edge and floor of ulcers of the intestine. In one instance the mycelium was between the serous and muscular coat opposite to an ulcer, and the appendix also was invaded; the lungs and pleura were infected as well. In three cases the vessels were blocked in places with mycelium, the probable origin of the metastases. The author is seeking to establish why these fungi are present in dysentery and liver abscess, and whether they are pathogenic or merely saprophytes.

A. G. B.

VAN DEN VRIJHOEF (H. C.). **Mastisolverbanden in de Tropen.** [Mastisol as a Dressing in the Tropics.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1914. Vol. 54. No. 6. pp. 718–724.

The author recommends "mastisol" as a preparation for use in the tropics, as a substitute for leucoplast and collodion. The perspiring and moist skin of residents in the tropics causes applications of these two substances to become quickly detached. Mastisol is free from this objection. If the edges of a wound are painted with a thin layer of the solution and a layer of lint with the woolly side downwards is then applied, an excellent adhesive dressing is obtained. The composition of mastisol has been described by van TIENHOVEN in the number for May 23, 1914, of the *Nederlandsche Tijdschrift voor Geneeskunde.* It is a proprietary substance, the export of which from Germany has been forbidden during the present war, and the author therefore gives several receipts for the preparation of a similar solution. The two which have given him the best results are:—

(1) after von NORDMANN,

Mastic in tears	20 grammes.
Benzol	50 ,,
Linseed oil	20 drops.
Colophonium resin	10 grammes.
Venetian turpentine	7 ,,

Dissolve in the benzol, and keep in a corked bottle, as a rubber stopper is dissolved by the benzol.

(2) after van ITALLIE,

Mastic	20 grammes.
Colophonium	20 ,,
Castor oil	3 ,,
Benzol	56 ,,
Salicylate of methyl (oil of winter green)	1 part.

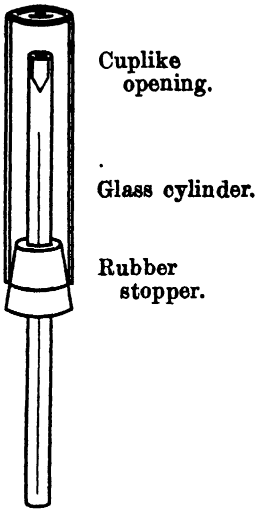
Mix.

Benzol is preferable to chloroform or alcohol, as a solvent, because it does not cause pain, when applied to a wound.

J. B. N.

WERNER (H.). **Ein neuer Stuhlentnehmer.** [A New Instrument for obtaining Stools.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. Apr. Vol. 18. No. 8. pp. 290–291. With 1 text fig.

The author refers to the difficulty experienced by consultants in obtaining portions of stools for examination when dysentery or intestinal parasites are suspected. The patient must be sent home and told to bring a stool, which may, owing to long standing, be useless for examination. Even in hospital it is often of importance to be able to examine fresh faeces at once. ESCHERICH and SATO have devised methods for obtaining stools. The author formerly used SATO's instrument, a glass rod with two holes bored through near one end. He has now improved this by having the rod hollowed out in the form of a beaker. It can be protected by a glass cylinder with a rubber stopper (see diagram), but this is not necessary. The instrument does not render the examination of naturally evacuated stools superfluous. The author has sometimes obtained a positive result thus, when the specimen brought out by the instrument was negative, and *vice versa.* The rod is smeared with a little glycerin or vaselin, inserted 5–8 centimetres, and moved to and fro. It can readily be sterilised and the hollow can be cleaned with a small brush. It can be obtained from the firm Schattschneider at Hamburg.



A. G. B.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

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APPLIED HYGIENE IN THE TROPICS.

By COLONEL W. G. KING, C.I.E., I.M.S. (Retired).

REPORTS.

APPLIED HYGIENE IN EAST AFRICA.

The East Africa Protectorate has made notable advances in commercial prosperity. Communications have been vastly improved and commerce has followed; but a stage has been reached where hygiene, the ally of commerce and national prosperity, cannot be safely ignored. Hence, instead of prescribing a scheme for a water supply here or a sewerage scheme there, after cholera or typhoid have harried a locality, the Colonial Office determined in 1913 to depute Professor W. J. SIMPSON, C.M.G., to East Africa, for a period sufficient for him to inspect and advise generally on the whole sanitary future of that area. The result is embodied in a characteristically complete and carefully considered Report that will repay perusal by all interested in Applied Hygiene in the Tropics.*

The rare opportunity of advising a policy for the future sanitary treatment of an area as large as France has been so dealt with by Professor Simpson that the true position of sanitation in the administration of a country has been kept fully in the forefront, by appeal to the common sense doctrine that, without health, the accumulation of wealth is for a people, as for the individual, a hopeless task; yet, this appeal is not made without cognizance of the truth that, whilst health is "within human limitations purchasable," to secure the wherewithal for the purchase, sanitation can no more reasonably demand funds that may cripple commerce than that, by untimely demands or restrictions, commerce should cripple sanitation. He summarises the problems he found it necessary to attack in the economic interests of the country by declaring: "It cannot be emphasised too strongly or too frequently that a healthy native population is the chief asset of East Africa." He continues:—

"The conditions existing in this Protectorate . . . . which foster disease and favour its spread are special and urgent. These conditions are:—

"1. Endemic plague in Kisumu and its district, in Nairobi and its environs, in the Ndara and Sagalla Hills, and the Taveta district.

"2. Prevalence of smallpox and cerebro-spinal fever.

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* Report on Sanitary Matters in the East Africa Protectorate, Uganda, and Zanzibar. (Printed for use of the Colonial Office.) Colonial Office: February, 1915.

"3. The epidemic of sleeping sickness, although it has declined, in the absence of watchfulness may still be a source of danger to trade.

"4. Immigration from infected countries of Asiatics whose habits, customs, and secretiveness are such as to require a watchful control over the diseases they spread, and the intimate connection which the various races in the population maintain with their friends and relations in infected countries and localities.

"5. The greater liability of the natives to epidemic disease, owing to greater intercommunication with increasing commerce; the movements of natives in connection with labour supply, and the unhealthy conditions under which they work, which need medical inspection, control, and enforcement of sanitary measures.

"6. The insanitary conditions existing and constantly arising in towns and trade centres with a mixed population of Asiatics and primitive Africans."

To meet the conditions thus stated, there is first an interesting history of the mode of spread of epidemic diseases, which must prove of standard value to epidemiologists, and deductions are then drawn as to points of danger on new routes of commerce. From this the reader passes to a consideration of localities, and thus to the sanitary, legal and financial necessities of each case. Finally, attention is drawn to the absolute need, if success is to attend efforts on the lines advised, for the early calling into being of a technically trained sanitary organisation complete in both superior and subordinate grades, which shall deal with not merely a few of the chief localities of the country but be reasonably proportioned to both urban and rural areas. In treating this part of the subject, Professor Simpson definitely states the necessity (when the problems of any but petty administrations are considered) of maintaining a "distinct cleavage between curative and preventive medicine by appointing special sanitary staffs, and the only exception to this should be in out of the way districts where sanitary and medical duties may be combined, and where the new arrangement would dovetail into those already existing." Methods of routine sanitation and for meeting epidemic diseases—amongst which the necessity of control over cotton importation from plague-infected areas is particularly emphasised—town planning and the necessary legal measures for control of land before the bulk passes into the hands of speculators, are very thoroughly gone into, and the whole is well illustrated by maps. He insists strongly on a definite policy, as essential in the sanitary and social interests of native, Asiatic and European races, of separate zones in towns being established as the starting point of site plans.

QUEENSLAND*.

Dr. J. T. MOORE opens his Annual Report for 1913 by the very necessary reminder that Queensland, whilst it deals with a white population, has to meet conditions that are largely tropical. He thus defines the position of Queensland in the epidemiological problems it has to face:—

"From an epidemiological standpoint the geographical situation of Queensland between 9 and 29 degrees south, and 138 and 153 degrees east longitude, must be regarded as one of much importance, especially when considering its vast area of 670,500 square miles, with a sea border of about 3,000 miles, containing many important commercial ports."

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*Annual Report of the Commissioner of Public Health.

He then proceeds to show how the geographical position affords special reasons for sanitary care in respect to communication with Hongkong, where plague is endemic, with Manila, where cholera periodically occurs, with Java and Timor where smallpox is endemic, with New Guinea, whence "carriers" may bring with them malignant malaria, cholera, and dysentery, and (*via* the Panama Canal) with Costa Rica and Guayaquil—the haunts of yellow fever, Whilst showing that the organisation with which he has met these difficulties must be increased and improved, in accordance with the ever advancing dictates of hygiene, he is able to claim that his staff has worked with enthusiasm and effectively.

The birth-rate was 20·26 and the death-rate 10·39 per mille, in an estimated population of 652,555. He declares that Queensland has one of the lowest death-rates in the world, and in support supplies not only statistics of other countries but, what really is a better basis of comparison of local health conditions, namely, the infantile death-rate per mille of births. This, he shows, amounts to only 63·2 per mille.

Notification of communicable diseases is required by legal enactments. During the year cases of typhoid, scarlet and puerperal fevers, diphtheria, erysipelas, phthisis, ankylostomiasis, infantile paralysis, cerebro-spinal meningitis and chicken pox were notified. But the well-known difficulty in all parts of the world in securing timely action by local authorities, is not absent in Queensland. Dr. Moore states :—

> "Unfortunately, through lack of foresight, coupled with a desire of false economy, many Local Authorities fail to secure the services of a Medical Officer of Health or a Sanitary Inspector, with the result that the utility of the notification system becomes futile and outbreaks of disease occur, and not infrequently become endemic, before the local governing body can be compelled to recognise its obligations."

Smallpox has been hitherto largely a negligible quantity in Australia, but it has recently been found necessary to consider the urgency of suppressing threatened epidemics. He shows that during the year a passport system was enforced. "The main gates of entry into the State were closely guarded by stationing officers at the border as well as by keeping a close surveillance over traffic arriving by sea, passengers being compelled to produce vaccination certificates, and to report at a central depôt at fixed periods."

Dr. Moore does not stay to discuss theories of fading virulence of smallpox nor of vaccination being regarded as a fetish of the past, but declares whole-heartedly his conviction of the importance of vaccination as the first line of defence ; he states :—"It is needless to quote the arguments in favour of or against vaccination, beyond saying that it cannot be too strongly emphasised that this prophylaxis is the only reliable preventive that can be employed against future invasions of smallpox."

Equally in respect to typhoid, he presses the advantage of anti-typhoid inoculation.

As to diphtheria he records that children lately affected, or in whose family a case has occurred, are excluded from school, till three swabbings of the throat bacteriologically examined prove them free of infection.

The following quotations from the Report show that in Queensland the vast importance of Applied Hygiene in the economics of a country is not forgotten, and that, personally, Dr. J. T. Moore rightly regards the great rôle of the sanitarian to be not the fussy work which appeals to the eye of the public when he attempts to suppress epidemics he has failed to stay, but the watchfulness and organisation which, through years of sustained effort, prevent them :—

> " In the rank of a nation's importance the health of a country stands foremost. On it depends the welfare and material prosperity of its people—in fine, it is the existence of a nation. The special feature of the work performed during the past year has been an untiring and ceaseless endeavour to protect the State from a visitation of an epidemic, and it is with pleasure that I am able to record that the success attained in this respect has far exceeded expectations. . . . . Finally a good foundation is necessary for the construction of a good building, so also is good executive administration necessary for the successful organisation of a public health department."

DISEASE PREVENTION.

MALARIA.

The Placenta and Malaria.

A research that must prove of practical importance is at present being conducted by the Board of Health Laboratory, Panama Public Health Department. In October, 1914, it was stated:—"The examinations of blood smears from the placenta and peripheral blood have disclosed several instances of placental segregation of parasites when they were practically absent from the peripheral blood." Evidently this research proved of interest, as by November it was announced that the scope of the enquiry was extended, so as to cover "the incidence of malignant and benign neoplasms among the white, mestizo and negro employees."

It seems to the writer that the action of the placenta in plague, as part of the problem of when and how fluctuation in numbers of the *B. pestis* in the peripheral circulation occurs, is also a matter that well merits attention by laboratory experts. References to results in the puerperal condition in this disease are exceedingly rare. Yet, in that part of the fight against plague which connotes prevention of introduction into a locality of the disease, as against suppression of epidemics, the position of the pregnant woman is of importance. As a matter of convenience—not of pathological significance—the term "puerperal plague" is in use. Fever without buboes followed by rapid abortion and death of both mother and child is the usual result. It is therefore, in practice, extremely likely to be overlooked just at the origin of an epidemic, when septicaemic plague exhibits itself by sudden death in old persons and pneumonia in the young. Irrespective of possibilities of inoculation by cuts or abrasions amongst the attendants of such cases in contact with blood discharged, the question of disposal of the placenta in respect to "soft feeding" by rats can hardly be ignored. The proportion of constantly pregnant women in an average healthy population is always considerable, and methods of disposal of the placenta differ largely with races In Major FRY's "First Report on Bengal Malaria," he quotes the evidence of Babu BAGALA MUKERJEE before the Burdwan Commission of 1873:—"The placenta which is discharged during the birth of a child is kept deposited in the room for five days, after which it is removed."

The importance of this question is emphasized by the following extract from the U.S.A. Public Health Report for 1914 (p. 239):

> "A series of experiments has been conducted for the purpose of determining, if possible, why plague is not present among ground squirrels until after approximately the 1st of April each year, which is the season of the year when the young squirrels are born. These experiments tend to show that active plague develops as a result of pregnancy in squirrels affected with chronic abscesses of lymphatic glands, liver or spleen. It is possible also that the young are infected with plague, either in embryo or immediately after birth, where the mother squirrel has plague. Further work is needed along this line for definite confirmation."

Larvicides.

The following interesting statement as to the method of action of emulsions of crude carbolic acid as larvicides is an extract (Jan. 1915, p. 8) from the Report of the Department of Public Health of the Panama Canal :—

> "The emulsions as they are prepared with rosin soap are suspensions of minute particles which, when external influences are eliminated, must be considered to remain unchanged in composition regardless of the dilution. As they are formed when the proportion of water to the undiluted liquid is approximately 2 to 1, each particle must contain a relatively high proportion of toxic substances.
>
> "The emulsions behave as typical emulsoid colloids. The particles display an energetic Brownian movement ; with a membrane permeable to electrolytes, they exert a definite osmotic pressure ; and they also carry a negative charge of electricity, migrating to the positive pole under the influence of an electric current ; when this charge of electricity carried by the particles is removed the emulsion is destroyed. The electrical nature of the particles is essential to their existence, and it is also a factor in the suppression of the specific chemical nature of the substances composing them. It also is very closely connected with the high bactericidal value of such emulsions.
>
> "Bacteria possess this same electrical property, but with this difference, the nature of the charge is very easily reversed. In an alkaline medium it is electronegative, and in an acid medium it is electropositive. In the presence of the particles of an emulsion of crude carbolic acid with soap, in an alkaline medium, the charge becomes positive and under the influence of the current the bacteria will travel to the negative pole. They become positive in the presence of the negative colloid and remove the charge from the particles of the emulsion. This removal causes the particles to break up, and the constituents of the emulsion are liberated around the bacteria in a concentration out of proportion to the degree of dilution."

Anti-Malarial Measures in Madras City.

Much concern was exhibited two years back by the Madras Corporation owing to a considerable increase of mortality from malarial fevers. A malarial survey was made as far back as 1903 ; but neither the evidence then accumulated nor the testimony in 1900 of Major CORNWALL, I.M.S. (then Health Officer) as to the important rôle in malaria of open wells in the City served to invite much attention, in the "absence of funds." Under the present regime, however, anti-malarial work under the superintendence of Capt. A. J. H. RUSSELL, I.M.S. (who was placed on special duty for the purpose) has progressed energetically. Thus, in the last quarter of 1914, nearly 4,000 wells were stocked with fish, and 295 tanks have been cleaned twice or thrice. Many of these are of areas exceeding 100,000 square feet. These tanks have been stocked with larvicide fish.

The commonest malaria-carrying mosquito in the city is the *A. culifacies*, as first identified by CHRISTOPHERS and STEPHENS in connection with their survey of Enmore, which is within a few miles of the city. But, smaller numbers of the following are also found :— *A. ludlowi*, *stephensi*, *fuliginosus*, *listoni* and *nigerrimus*—the *A. stephensi* being particularly the inhabitant of wells.

The effect of these measures is so far favourable, but neither the lapse of time nor the extent of the statistics suffice as yet to give a decision.

Fish as Larvicides.

In a recent sanitation number of this *Bulletin* (Vol. 5, No. 3, p. 151) will be found certain observations by Mr. H. C. Wilson, the Expert Pisciculturist to the Madras Government. The Madras Fisheries Bureau has now issued a brochure embodying further remarks by this officer on fish as larvicides.

On the subject of preventing ponds (so-called "tanks" of India) becoming breeding grounds for mosquitoes, he urges that "the margins of ponds, etc. be trimmed, and overhanging plants that reach to the surface of the water should be cut back, as these tend to hold up debris and protect the larvae." He particularly requires attention to a point that is very often overlooked in such work, namely, that where ponds are concerned, it does not suffice to go through the ceremony of trimming the edges and stocking with fish, but that the foreshore and neighbourhood should be thoroughly searched for petty pools. When these cannot be filled in, he advises the expedient of draining them into the tank. Where it is not possible either to fill or drain borrow pits, he advises linking them up by open channels discharging into the borrow pit at the lowest level, and keeping these drains free of weeds and debris and stocking them with fish. On the advent of the hot weather, the chances are that the borrow pit at the lowest level would retain water, and in this would be found the fish—as they would retire with the receding water. He would apply this same principle to swamps which are not readily eradicated by drainage, by constructing "a pond at its lowest level and draining the swamp by open trenches into the pond."

He supports the great advantage of stocking open wells with fish, and quotes the case of the town of Cuddapah (a notoriously malarious place) where he found that 50 per cent. of the wells were infested with larvae of the *A. stephensi.* As to paddy-fields, he revives, from the malarial point of view, the plea so strongly made by the late Mr. Thomas, I.C.S., the author of the "Rod in India," who showed how essential it was for economic reasons to prevent the wholesale trapping of the small fry of fish in rice-fields. It is significant in respect to the freedom from malaria of the highly irrigated districts in the South of the Madras Presidency that "in the Tanjore District and up the West Coast where fish is plentiful and the paddy fields are not trapped, they simply swarm with small larvae-eating fish, especially Haplochilus."

The following experiment conducted by Mr. Wilson is of interest in reference to the judicious use of tidal waters :—

> "I discovered a salt water pool on the shores of the backwater with one living mass of larvae. As their breeding areas had been restricted the mosquitoes had evidently bred in this small pool in thousands. It was shallow, not more than 6 to 8 inches at the deepest part, but was cut off from the backwater by a small sandbank. I divided this pond into sections and cut a channel from one into the backwater deep enough to allow small fish a clear passage. I removed all sea weed and debris from both sections and examined the following morning. Fish were found in the one section and most of the larvae were destroyed, only a few remaining in the shallowest portion ; whereas in the other isolated section they were teeming. The sides of the former were sloped to make it deeper round the margins and the same evening an examination proved the fish had cleared the lot of larvae out of the section opened to the backwater. Backwaters

as a rule when open to the sea contain an abundant supply of larvicides in the way of small fish, and an examination along the shores where fish have free access will prove that there are very few larvae."

In regard to stream beds, he advocates the usual method of securing definite channels free of weeds at the margins; and where rock is dealt with (in the hollows of which small pools form) he would use dynamite, the chisel to form small drains, or filling of the bottoms with cement.

As to drainage channels on the sea coast, he advises the removal of obstruction and the deepening of channels when necessary, so as to place them under tidal influences and the action of fish.

The economy of fish as larvicides.—In the *Bulletin* above referred to, at p. 152, it was shown that, provided the sides are well and systematically kept, there may be cases where filling in of ponds at an unusual cost may be usefully put aside in favour of fish larvicides. In this matter Mr. WILSON, as a pisciculturist, also insists upon the superiority of the method to the use of cresol or petroleum as larvicides. His experience however largely concerns the treatment of ponds and pools, where labour is confined to margins of water within banks in small areas. But where drainage channels which may extend over many miles have to be treated, the subject assumes another aspect. Mr. Le PRINCE, Chief Sanitary Inspector of the late Isthmian Canal Commission, thus deals with the subject:—

"In order to keep a ditch of low grade, or a stream, perfectly free from vegetable growth and algae, so that the fish may have access to all parts of it, it would be necessary carefully and properly to clean out such a ditch or stream about every ten days. As we have had many miles of streams and ditches near settlements, the process would be excessively expensive. . . . . In many cases we have cleaned the banks of rivers of vegetation and all in large numbers, but many of the anopheles larvae take care of themselves and live in spite of the fish being present. They live under small stones and in the mud. The fish miss so many of them that we cannot rely on fish here, if we expect to reduce the larvae to a minimum. The smallest of these same fish (one inch long and larger), if placed in a jar of water containing larvae, will take thirty or more in twenty-four hours, and yet in the streams they cannot accomplish the results that we are expecting and are achieving. . . . . We are obtaining good results in using larvicide as per above formula in running streams by making weekly applications. . . . Unfortunately, we kill the fish by this operation, but then on the other hand, as the fish cannot perform the desired results which we are otherwise accomplishing, they have to go."

Natural enemies of the mosquito.

Mr. WILSON states that the *Daphne pulex*, a minute crustacean, attacks both small fish fry and the larvae of mosquitoes. The method adopted by the crustacean is in this case "the nipping off or pulling out the long lateral hairs until the larvae were unable to regain the surface and so dropped to the bottom, where they were seized and evidently their vital juices extracted." He also claims the larvae and full grown beetles of the Dytiscidae and the *Notonecta glauca* as mosquito enemies.

Malaria and the Birth Rate.

At page 427 of this *Bulletin* (Sanitation Number, Vol. 4, 1914) reference is made to the results of introducing irrigation into an area without due recognition of the necessity for not only taking the water on to the soil, but draining off the surplus. The increase of malaria in the area of the Mon Canal, Upper Burma, subsequent to its opening in July 1911 was described. Lt.-Col. C. E. WILLIAMS, the Sanitary Commissioner, now reports (1913) that great improvement has resulted from the construction of main drainage channels and culverts, but it is yet too early to judge of the effect upon malaria prevalence. In the meantime, the epidemic has been sufficiently severe to show its effects on the birth-rate. He states:—"Thus when visiting Kyitkaing Village, which was most severely affected by the disease in 1912, I found that there were only 8 births on the register against some 32 in the preceding year. Close enquiry showed that there had been no omissions to register births."

Irrigation and Drainage.

"Indian Engineering" (Calcutta) in articles discussing "Punjab Irrigation" and the "Evils of Irrigation" (April 24, 1915) affords information showing that the great importance of irrigation projects being accompanied by provision of methods for removal of surplus water, in the interests alike of malaria prevention and agriculture, is being held in mind by the Government of India. It states:—

> "Of important schemes about to be undertaken is one connected with the utilization of the surplus water of the Sutlej river; another is the Amritsar Hydro-electric Irrigation Scheme designed to substitute pumping of the sub-soil water for the flooding of a track with canal water which is already suffering from waterlogging. It will be remembered that complaints have been rife for some years past of the growth of such tracts in the canal irrigated areas of the Punjab, leading to the spread of malaria and abandonment of cultivation. The attention of Government has now been concentrated on these drawbacks to free irrigation, and measures are to be taken both to restrict irrigation and to drain water-logged soil. Perhaps the temptation to spread canals over a country that pays so handsomely for water has been succumbed to somewhat indiscriminately, and it will be necessary with all future canal schemes to make provision against water-logging in the preparation of each project instead of having to find remedies for it afterwards. Another end that has been seriously tackled is seepage, since the benefits of lining of channels has been proved experimentally. When this work has been carried out on a large scale we are sanguine it will raise the capacity of the canal systems by an appreciable percentage."

This reversion to the policy recognised by the Honourable East India Company in 1855 will be welcomed by sanitarians as a solid instalment of sanitary reform in India in 1915.

PLAGUE.

Plague Immunity of Localities.

Madras City has been described as immune to plague; it has not been so in the past, and it is very unlikely to be so in the future. Rangoon, Burma, was free from plague up to 1905, although in communication with plague infected ports in India and China. Ceylon was classed as immune till 1914, when its importation of Madras coolies probably underwent change of completeness with reference to the Indo-Ceylon Railway. Hyderabad City, Deccan (elevation

1,690 ft.) by forceful quarantine measures against the lower orders was, in the midst of infected country, free from 1898 to 1911, notwithstanding large merchandise traffic. Travancore territory adopted the Madras Plague Regulations; it is possessed of much elevated country; notwithstanding its free communication by land with the infected Malabar and Coimbatore Districts, it still remains free. In the United Provinces, Banda was long considered immune and, of special interest in the grain theory of spread, has yielded this year. Bettiah, in Behar and Orissa, has also been recently attacked for the first time.

The whole of the Madras Presidency was free from 1896 to 1898, whilst plague ran riot in the adjacent territory of Bombay. During that period, the only merchandize (including in that term grain and other food material) prohibited from free interchange was second-hand gunny bags and rags. The determining factor was the sudden movement of numbers of panic-stricken human beings from closely adjoining infected foreign territory. Guayaquil has been duly attacked with plague, and is now wondering why this disease has not yet spread to the mountains of the interior. The people of Guayaquil therefore (to meet local requirements) have inverted the recent immunity theory of the Plague Investigation Committee.* In the U.S.A. Public Health Report for 1914 (p. 169) it is stated "the altitudes of the interior still resist the invasion of this disease and as *rats and fleas are abundant*† it is supposed that the cold is the factor most concerned."

Perhaps, however, the nearest analogy to conditions required in the theory of immunity which the Ninth Report of the Plague Investigation Committee has excogitated, is in respect to Mombasa—the long immune. The coast of the East Africa Protectorate possesses, as classified officially by the Principal Medical Officer (Dr. A. D. MILNE) a mountainous zone, a desert zone and a coast zone—all differing considerably in meteorological details. At Kisumu, and at Nairobi in the mountainous zone, plague has prevailed from time to time; but Mombasa, in rail connection with these and in communication with plague infected ports, remained immune. Then arose the theory that whilst plague might prevail at Nairobi, it could not establish itself at Mombasa by passing through the Coast Zone; Mombasa could only be invaded by sea. But, unfortunately for this theory, after careful investigation Dr. A. D. MILNE (supported by Professor SIMPSON) shows that the chances are that the mountainous zone infected the Coast zone in 1912‡.

For the sanitarian the moral as to theories of plague immunity depending upon climate is "wait and see"; and, whilst recognising climate as a minor ally, when invasion is threatened by overland routes, to protect the rats in disease-free areas from infection by man, as ordinarily the more numerous and longest distance traveller and possible flea bearer, and to protect man against the infected rat and its fleas, as comparatively rare and unwilling transportees in particular articles—attractive for food or shelter. On land, in long distances, man is the chief plague bearer to the rat; in short distances, the rat is the chief plague bearer to man.

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*See this *Bulletin*, Vol. 5, p. 389.

†Italics not in the original.

‡Report on Sanitary Matters in the East Africa Protectorate, etc., by Prof. W. SIMPSON, C.M.G. 1915. p. 79.

The Climbing Powers of Rats.

The Report (for January 1915) of the Department of Health of the Panama Canal gives an instance of rat athletics. In a rat-proof building, a large rat "came from behind a counter, jumped upon the same and from thence to the wall shelves. Continuing he jumped several feet to a drop-light wire, up which he ran, thence along a 1-inch water pipe where he disappeared on his way to the second floor." During an enquiry in a Devonshire village and neighbourhood, where many of the house walls were formed of mud freely traversed and inhabited by rats, the writer was assured that in a rat haunted slaughter house a man sat still on being approached by a rat, and was used as a ladder to reach a roof beam. The farmers in the Deccan Districts of the Madras Presidency when retired to rest at night, regard the scampering of rats over their bodies as a matter of no moment. These farmers are not immune from plague.

Anti-Rat Fumigation in Ships.

The U.S.A. Public Health Report for 1914 records that, in Philadelphia, the use of carbon monoxide instead of sulphurous gas has lowered the time of necessary detention of ships by one half. The Harker apparatus is employed "and its administration is simple, provided its danger to human beings is never forgotten." The Cuban authorities prefer the use of hydrocyanic acid gas for vessels "docked at Habana and bound for Cuban ports." On the other hand, for vessels leaving Cuban ports for the United States sulphur fumigation is employed.

Eviction of Rats.

On the Panama Canal, a one gallon oil can, to which has been attached a three-eighths inch wide rubber tube, is being used successfully as a formaldehyde gas generator. Permanganate of potash is added to the formalin and the fumes are transmitted by the tube into burrows, causing the rats to bolt; then they are killed by men with clubs.

TYPHOID.

The belief in prevention being better than cure is not undergoing weakening on the Panama Canal. The Annual Report of the Department of Public Health for 1914 states—"In the latter half of the year a periodic physical examination including urine and faeces, has been made of all food handlers in the kitchens, mess-rooms and commissaries of the Panama Canal, with the result that one typhoid carrier and a number of cases of contagious diseases were detected and eliminated."

HELMINTHIASIS.

Ankylostomiasis; incidence by race.

The Philippine Islands are as great a resort for various tropical races as Port Said would seem to be for those of temperate climates. Hence the examination of aliens and steerage passengers on arrival to the extent of 6,776, affords good material for ascertaining the proportion suffering from ankylostomiasis. According to reports of examination* positive results were secured in Chinese, 2·42, Japanese, 0·78, Indians, 8·49, Malays, 6·70 per cent.

The Report of the Department of Public Health of the Panama Canal for November 1914, draws special attention to the fact that in 1905, when routine post-mortem examinations were commenced, Columbians were proved infected to the extent of 80 per cent. and West Indians 52 per cent. By 1912, the infection of Columbians had decreased to 58 per cent. and West Indians to 34 per cent.—a result which is ascribed to treatment in hospitals, and "to the relative absence of soil pollution in the Canal Zone and the resulting infrequency of new infection."

The Eradication of Ankylostomiasis.

British Guiana has been the fortunate recipient of the practical and philanthropic efforts of the Rockefeller Foundation International Health Commission, in a campaign against ankylostomiasis. In a country so largely depending upon imported labour of Asiatics, who show so high a ratio of infection, the subject becomes one of great economic importance. The local authorities have already shown the great advantage of special measures in reducing this disease amongst unindentured labour, and these have been attended with great saving of life. The Commission therefore have confined their efforts to the more difficult problem of treating the general population. For success it was desirable to secure that all persons should consent to treatment, which implies the application of both power of organisation, and much tact. Their experience led them to direct that a "unit of operation" should be :—

"A territory with—

"(*a*) Legal or natural boundaries.

"(*b*) An aggregate of population of not more than 15,000, and fewer if sparsely inhabited. This is probably the maximum which can be properly handled by one Medical Officer and clerical force.

"(*c*) A Central Office, situated near the centre of the District, where most of the clerical and microscopical work may be done, and where the large record books may be kept, as it would entail much loss of time and expense to move the Central Office outfit from village to village during the progress of the work."

A census of the inhabitants of the selected area was taken. For each 1,200, one male nurse and one assistant were appointed "for the purpose of administering thymol." Previous to commencement of treatment, these persons served as census takers. Besides administering thymol, they carried out night soil conservancy inspection. They issued to each person for specimens of faeces to be gathered by them, according to roster, "a one-fourth ounce container with paper inserted in the lid, obtainable from the Myers Manufacturing Company, Camden, N.J., U.S.A." They are inexpensive "and in general use for this purpose." For examination of faeces, a centrifuge capable of accommodating 20 specimens at a time was employed. For microscopical examination three young natives of India were trained, and found sufficient for work in a population of 14,000.

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* United States Public Health Service Report for 1914, p. 218.

A fair trial was given to the "daily" method of treatment with thymol and the intensive method. The Commission concludes in favour of the latter thus :—

> "1. The 'Intensive' treatment presents less difficulty as an administrative problem.
> "2. It cures a larger percentage of those infected.
> "3. These cures are secured at a smaller per capita cost."

Ankylostomes in Soil.

Dr. LEIPER, writing from the Helminthological Department of the London School of Tropical Medicine in January of this year, holds out hopes that, as a result of experiments under conduct by him, it may be possible by "employing chemical manures to destroy ankylostomes in faeces without impairing the organic manurial value, and that if laboratory experiments support this view there may result" a simplification of the night soil problem in tropical countries.

Schistosome Experiments.

At Hankow, the Expedition of the London School of Tropical Medicine secured a dog infected with *Schistosoma japonicum.* With this source available for material Dr. LEIPER and Surgeon ATKINSON state* that search was made for the special species of mollusc which presumably would form the intermediary host of the trematode. For this purpose, a visit was made to Katayama, Japan, which is an agricultural area recognised as suffering greatly from this disease. A markedly common form of mollusc in this area was detected as a probable bearer of the Cercariae. This mollusc, named the *Katayama nosophora*, was proved to have a definite chemiotaxis for the newly-hatched trematode embryo. The following conclusions were formed :—

> "These experiments, carried out with the greatest precautions to avoid fallacy, convince me that the Looss hypothesis (which for so long has dominated scientific opinion, and which supposes that infection takes place by direct contamination with newly hatched embryos without the intervention of an invertebrate host) is entirely erroneous, and that prophylactic measures based thereon would be wholly inefficient. The life cycle of the *Schistosoma japonicum* conforms in essential respects with that of other trematodes. It remains now to be demonstrated that *Schistosoma haematobium*, the cause of bilharzia disease, follows a similar course."

In reference to the last sentence, the War Office has asked for Dr. Leiper's services to study bilharzia disease in Egypt. This work, with the experience recently gained in China and Japan, must, with ordinary good fortune, provide definite results, and the possibility of concentrating practical sanitary effort upon a disease which may, in the absence of such efforts, in the near future become a source of anxiety on the ever-increasing routes of commerce. That it is necessary to refer to good fortune attending a scientific investigation, is evident from Dr. Leiper's report. The subjects of his experimental infections were mice, and these valuable possessions were kept in his cabin *en route* for England. But one of the instinctive haters of mice, in the form of a "lady in a neighbouring cabin" demanded their relegation to the ship's butcher for care, with the result that at the end of the voyage only one precious animal survived. It was, however, on arrival in England honoured by a special post-mortem in the presence of Drs. Leiper, Sandwith and Haenschell. As a result Dr. Leiper was able to report:—"Living Schistosoma, male and female, worms were then demonstrated in numbers in mesenteric vessels."

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* Report of the Advisory Committee for the Tropical Diseases Research Fund, 1914. London: Printed under the Authority of H.M. Stationery Office by J. J. Keliher & Co., Ltd. See also Brit. Med. Jl., 1915, Jan. 30, p. 201.

RABIES.

Anti-rabic Inoculation.

The Director of the Pasteur Institute for Southern India (Major J. W. CORNWALL, I.M.S.) in his Report for 1914 enters into several interesting details as to results of treatment during 1907 to 1914. In that period, 5,480 persons (4,674 males and 806 females) have been subjected to anti-rabic treatment. Although he places no stress on the subject, he shows that it "may be noted for what it is worth that the hottest and driest months, namely, March, April, May, June and October provided the least number of patients." Of the 5,480 persons treated, 8 died of hydrophobia during the course of treatment, 18 developed this disease within 15 days of the end of their treatment, and 42 more than 15 days after the treatment. Of the fatal cases, 14 had been bitten on the face. He furnishes a table of ages of subjects, showing the curious fact that there are periods of greater susceptibility to hydrophobia in childhood and again in later life, and that young adults are the least likely to develop it.

A scheme was instituted in communication with local authorities to ascertain histories of persons bitten and treated at the Institute, and of those bitten but not treated. The data collected are not sufficiently large to give a definite opinion; but so far it would appear that, amongst 169 persons treated at the Institute, 5 deaths occurred from hydrophobia, or about 3 per cent.; whilst amongst 275 untreated, there were 20 deaths, or 7·2 per cent. He then states that the figures "suggest that, as was suspected when the enquiry was undertaken, the ordinary statistics of this Institute are misleadingly inaccurate, and I would go so far as to assert that a similar condemnation is applicable to the published statistics of many other Institutes."

In the Antirabic Institute, Egypt, during 1913, among 609 cases in which the diagnosis of biting by rabid animals was established by laboratory work and microscopical smears, or by the evidence of skilled witnesses, treatment was by the cord attenuated in glycerine for at least twelve days. Previously, attenuation for only three days had not proved satisfactory. In cases of injury of the head and bites on other uncovered parts and, occasionally, when the bites are through clothing, seropathy is combined with vaccination "and during the first three days of treatment a mixture is injected of equal parts of decimal emulsion of fresh cord in physiological water and anti-rabic serum." Two deaths occurred more than fifteen days after treatment, and "fourteen cases occurred during treatment or less than fifteen days after its termination."

BERIBERI.

In the Thirteenth Annual Report of the Institute for Medical Research, Kuala Lumpur, the Director (Dr. Henry FRASER) in discussing the subject of beriberi invites attention to two matters, which he considers it desirable those investigating beriberi should hold in mind. Firstly, he would require that the loose term "pericarp," ordinarily used in defining the portion of the grain the more or less complete removal of which in polished rice conduces to beriberi, be more generally recognised as referring to the "sub-pericarpal layers." Again, where confusion between the beriberi resulting from deficiency arising from absence of these sub-pericarpal layers and other somewhat similar diseases exists, he would remind investigators that "beriberi is only a form of polyneuritis and students of this disease know that not only forms of polyneuritis of different origin have been called beriberi, but that diseases of which polyneuritis may not be a prominent feature such as "epidemic dropsy," "Ceylon beriberi" and the like have been included under this name."

It is a fair deduction from the effects of milling on the sub-pericarpal layers of rice that moulds may bring about almost the same result. Instances of this causation have been referred to in previous (Sanitation) numbers of the *Bulletin.*

The following is further evidence in the same direction by Lieut.-Col. HARRISS, I.M.S., in his Report as Acting Sanitary Commissioner for Burma in 1909, p. 17 :—

> "During the rainy season a severe outbreak of beriberi occurred among the coolies engaged in the construction of the new lighthouse at Beacon Island off the coast of Arakan, resulting in a number of deaths. . . . . In this instance damaged and insufficient food-supplies appear to have been responsible for the outbreak, which was intensified by the inclement character of the weather and the discomforts and isolation inseparable from residence on a barren island during the rainy season. Outbreaks were reported as having occurred among the Chinese coolies employed in the tin mines in the vicinity of Victoria Point and similar outbreaks occurred among gangs of labourers employed by timber companies in the forests of the Myitkyina and Upper Chindwin Districts. In every instance suspicion attached to the damaged rice supplied as rations to the labourers, and specimens of this grain sent to the laboratory at Kasauli for examination were reported on as being mouldy and unfit for food."

According to the U.S.A. Annual Public Health Report for 1914 (p. 163) the Japanese liners arriving at the Philippine Islands "almost without exception [reached port] with cases of this disease amongst the crew. . . . . A varied diet is furnished in these vessels and polished rice is not used."

On the Panama Canal, in 21 cases of suspected beriberi* it was considered diet was not connected with the disease. On the other hand, in the Annual Report for the Panama Canal for 1914 (p. 10) the following statement occurs :—

> "A sanitary survey of the town of San Miguel, Pearl Islands, Bay of Panama, was made in November. . . . The information was elicited that beriberi, which used to be rife among the pearl fishermen, was never encountered among the naked divers, who returned daily to the islands, but was met with exclusively among the contract divers, who used the helmet and were quartered and fed on boats which cruised around the islands, subsisting partly on canned provisions, and who frequently remained for months on the boats before coming ashore."

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*Report of the Health Department for December, 1914.

The Wollaston and Kloss expedition quoted by Dr. Fraser is of course a classical instance of the undesirable influence of milling in aiding deficiency disease. These explorers journeyed into the interior of Dutch New Guinea. Previous expeditions by others had signally failed owing to outbreaks of beriberi. The staple grain used in the former expeditions was polished rice. Wollaston and Kloss used unpolished rice. Dr. Fraser states:—" The expedition was in all of seven months duration, and despite the laborious nature of the work, among the 204 rice-eating natives no single case of beriberi occurred." The total diet used on this expedition is given; although it does not materially weaken the case, the contrast of the diet used by former expeditions with all items as to nature and amount would have been desirable. Probably, such information could not be procured owing to lapse of time.

The following is a statement by Lieut.-Col. C. E. WILLIAMS, I.M.S., Sanitary Commissioner for Burma, in his Annual Report (p. 13) for 1913, which would go to support the theory of moulds or other cause affecting the nutritive value of the sub-pericarpal layers:—

> " In August and September a small outbreak took place at the Imperial Police Training School, Mandalay. A change was made in the rice supply and this was followed by a cessation of the outbreak, though it cannot be said to be clearly established that this was dependent upon the nature of the diet. Many cases occurred at this period in the town, mostly among the poverty-stricken classes. Although all Civil Surgeons admit that the majority of sufferers from beriberi eat rice of doubtful quality, and that the disease is probably associated in some way with this diet, cases are frequently observed in which diet appears to play no part. Thus the Civil Surgeon, Akyab, asserts that he has treated cases of this disease in well-to-do persons living on a rich mixed diet, and the Civil Surgeon, Bassein, has seen the disease in Burmese villagers who do not eat milled rice, and habitually use a mixed diet which elsewhere does not lead to outbreaks of the disease."

SAND AND WATER.

The Hindu Shastras direct attention to earth and water as purifying agents for domestic metal vessels. In conditions of life removed from defilement by scrupulous adherence to rulings by all concerned, these agents are doubtless valuable for the purposes indicated; but, with the passage of time and altered conditions of modern life, the Hindu obeys the letter but not the spirit of the ruling. It is quite a common event to find a high caste Hindu, who would not approach within yards of a lower caste fellow countryman lest he be polluted, fail to perceive that in using earth or sand and water from places no better than public gutters risk of pollution is run. In the houses of Europeans in India, it requires a good housewife to make sure that metal vessels used in the kitchen are not *cleansed* with wood ashes, mixed with earth gathered by the cook's assistant within arm's length of the kitchen door, which has been defiled for generations by slops and the bare feet of servants who visit by no means cleanly latrines.

The writer has known local authorities in charge of public water filters, content to leave to contractors the choice of sites where the sand could be obtained. In one instance, where typhoid had previously existed amongst European troops, he found the selected site for the filter sand was the bed of a river forming the usual morning *place d'aisance* of a large village population.

It is obvious that, irrespective of the chances of contamination of vessels by typhoid and cholera matter, under such conditions risk of infection by intestinal parasites, more especially ankylostoma, is considerable.

Major T. Forrest, R.A.M.C. (T.)* produces a concrete example of such undesirable methods of purification of vessels, by quoting an outbreak of diarrhoea in two companies of the 16th Battalion H.L.I. when in camp at Gailes, Ayrshire. It was possible for him to exclude both the water and food supply as the cause of the condition. He was finally able to show with the aid of exhaustive bacteriological examination by Dr. R. M. Buchanan, City Bacteriologist, Glasgow, that the outbreak was due to local contamination owing to the " camp kettles being scrubbed with sand picked up indiscriminately. Clean sand was provided, and orders issued that it only was to be used for scrubbing purposes. Thereafter no further cases occurred." That no further cases occurred is sufficient presumption that the new sand was procured from a sanitarily safe place; but the moral certainly is that, in practice, there should be no doubt as to the actual site of origin of apparently clean sand.

Nor does the question of sand and water concern only the Hindu or the British soldier. Before reciting prayers, the Mahomedan should undergo purification, the least of which, known as " waza," consists of ablutions with water of the ears, arms, hands and face. If the shoes are defiled, they should be purified by earth. If however water be not available for ablutions, either sand or dust may be employed (Tayyammum). The chief desire is apparently that at least the hands, and arms as far as the elbows, be thus purified. In mosques, water is usually placed at disposal of worshippers in small open cisterns sunk below the floor level. As all and sundry use this water, it is obvious that it may form a disease bearing medium.

It is of course the foundation of treatment of races within the British Empire that no interference with their religious methods is permitted by the Governments concerned, provided neither inhuman practices nor such as are likely to disturb the public peace are in vogue. Consequently, suggestions for sanitary precautions in such matters must originate, or at least be carried out, with the full consent of the people of the religion concerned. In such matters, the Egyptian Government has to deal with a well educated class of Mahommedans, and it is satisfactory therefore to find that it has been possible for it to pass the Law of July 1st, 1911, which came into force in July, 1913†. This required the abolition of insanitary cisterns below floor level, known as " meidas," and in lieu " the installation of water taps, so as to ensure a supply of fresh water for each person."

SOME LIMITATIONS IN WATER PURIFICATION.

Dr. Fraser, in his Annual Report of the Kuala Lumpur Institute for 1913, draws attention to the fact that the present day tendency is to obtain water supplies of towns from sewage polluted rivers, after filtration through mechanical filters. He suggests that the purification of diluted sewage for domestic purposes has a curious fascination for some minds, and invites attention to the fact that, with a rainfall of 100 inches per annum and hills within reasonable distance of towns in the Malay States, there is no necessity to select, by preference, streams in the plains whose history of contamination permits of no doubt. To this the writer would add that, with so rich a rainfall (even allowing 60 inches evaporation per annum), if the hills were not in close proximity to the town, a large reservoir area would go well towards supplying a pure rainfall water supply. Dr. Fraser illustrates some of the difficulties which those determined to drink purified sewage have to encounter to secure their ends, as follows :—

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*British Medical Journal. 1915. March 13. p. 464.

†Egypt, Ministry of the Interior, Dept. Public Health, Annual Report for 1913, p. 36.

> "Recently a case came under our notice which illustrates the danger which may arise from the use of mechanical filters in this country. The water supply of a large town has hitherto been purified by the use of sand-filters. It was considered possible that by means of mechanical filters an equally if not more satisfactory filtrate would be obtained and an economy in cost effected. The raw water contains a sufficient amount of suspended material to render it faintly opalescent, but that opalescence is not removed as a precipitate by the use of alum. Consequently the water after passing through the mechanical filter was still opalescent and contained the most of the added alum. It was next attempted to remove the opalescence by the addition of a small quantity of soda-ash, but this substance causes the suspended matter to pass into solution and the water is cleared. The mechanical filter is therefore deprived of what is claimed to be an essential part of the process and it is obvious that for this water its use is not permissible."

Liquid chlorine is now available in the market in steel cylinders, holding about litres 100 of chlorine.* It exhibits itself in gaseous form on being released from pressure. Possibly, it is this form that has been used against our troops by the Germans†. Its more legitimate purpose is the supersession of the use of hypochlorite of lime for water purification. The advantages offered are the dealing with an agent of definite strength under a control that can be modified to meet varying conditions of water with promptitude, as contrasted with the use of unstable hypochlorite of lime.

It is apt to be forgotten that, although the chlorine process goes a long way towards sterilization, in practice, the term is hardly applicable. Mr. H. E. JORDAN, Chemist for the Indianapolis Water Company, recently reported‡ that of 201 samples of water treated by hypochlorite of lime "21 gave positive *B. coli* immediately after treatment, 39 after 24 hours standing, and 42 after 48 hours."

Work at the Hygienic Laboratory, Washington, has shown that the use of the ultra-violet rays for purification also has its limits, in that the water to be treated should be absolutely clear.

PERSONAL PROPHYLAXIS.

Prophylaxis of Snake Bite.

Sir T. Lauder BRUNTON some time back represented to the Government of India that the use of permanganate of potash for treatment of snake bite would be facilitated by the issue of a little instrument invented by him, to be carried in the pocket, and now known as "Brunton's lancet." In a wooden case is contained solid permanganate of potash and, in a separate compartment, a small lancet. The employment of permanganate of potash was first advised by Sir Joseph FAYRER in 1869. In 1881, Dr. Vincent RICHARDS carried out experiments on the subject and concluded that if permanganate of potash be used so as to come in contact with cobra venom at the site of a bite within four minutes of insertion, this could be rendered inert. He laid stress upon the requirement that in opening the wound made by the teeth of the snake the actual spot in the subcutaneous tissue should be identified by the dark colour immediately surrounding the insertion point. Sir Lauder Brunton's little instrument therefore offered the opportunity of the quick insertion of the permanganate Dr. Vincent Richards held requisite.

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* Electro-Bleaching Gas Company, 25, Madison Avenue, New York City.

† Our troops should find these cylinders, if not a military, at least an excellent sanitary aid in purifying water.

‡ Engineering Record, New York, May 15th 1915, p. 621.

In accordance with Sir Lauder Brunton's advice large numbers of these "snake-bite lancets" have been issued by Local Governments in India. When, however, official reports were required as to their utility, it was realised that difficulty existed in deciding whether the snakes concerned in the histories of cases really were poisonous. The tendency is undoubtedly for excited spectators, or scared subjects of snake bites, to believe that the particular snake they have had a glimpse of which did the deed must be poisonous; for the same reason it is usually abnormally large. Scare is also so great in the belief that death is imminent, that not infrequently a patient is brought for aid in a state of collapse. Such cases are fruitful sources of fame and fees to the users of charms. Hence, both highly favourable and unfavourable reports were forthcoming. Thereupon, the Government of India deputed Surgeon-General (then Lieut.-Col.) BANNERMAN, C.S.I., to undertake a series of experiments at the Bacteriological Laboratory, Bombay, as to the efficacy of the permanganate of potash treatment. This officer conducted elaborate and careful experiments as to the effects of permanganate after bites, both by the cobra and daboia. The conclusions arrived at by him were :—

"1. That a dog bitten by a cobra cannot be saved by the local application of powdered potassium permanganate rubbed in after free incision of the bitten place; nor by a similar application of a solution of the powder.

"2. That it may be saved, however, by the immediate subcutaneous injection of 10 c.c. of a 5 per cent. solution of potassium permanganate; but this solution is so strong that gangrene of all the tissues of the foot is produced.

"3. That if this treatment be delayed for even two minutes, a fatal result cannot be averted.

"4. That a dog bitten under natural conditions by a Russell's viper cannot be saved by the local application of potassium permanganate, however applied."

The following statement by him would especially seem to render the use of this antidote hopeless :—

"It appears that potassium permanganate in solution does not act *in vivo* with the same effect as *in vitro*, and that even four times the amount that serves to neutralise cobra venom in a test-tube will not with certainty prevent fatal poisoning in an animal which has received 10 M.L.D. By employing the expedient of leaving the needle *in situ*, and fitting on to it another syringe containing the solution of potassium permanganate, it is certain that the utmost chance was given of getting the chemical into intimate contact with the venom it was designed to neutralise. The time of application was also immediate."

The following is an instance, in practice, of failure of the permanganate of potash method, quoted by the "Rangoon Gazette" of the 14th April of the current year :—

> "A large cobra bit one of the prisoners in the foot as he was working in the jail rice-field at Myaungmya last October, writes a Myaungmya correspondent. The warder with the gang applied his lancet and permanganate, which they all carry and are taught how to use, but it availed little or nothing; Burmese medicine was also used with no better effect, for the man died well within the hour."

Anti-Plague Inoculation.

In a well considered and interesting Report on plague in Mombasa Captain D. S. SKELTON, R.A.M.C., shows that whilst all ordinary measures for the suppression of plague were carried out, a special effort was thought necessary to secure inoculation of the population with HAFFKINE's vaccine, as the general sanitary condition and possibility of rat control were hopelessly poor. This was carried out so effectually that he claims that of a population of 30,000, 23,800 were inoculated. Between June and August, amongst a monthly inoculated average population of 12,000, the total attacks of plague were 15 with 12 deaths, whilst in the uninoculated average monthly population of 21,900 the total attacks were 121 with 103 deaths. Between September and November, re-inoculation was undertaken with the object of securing an increased immunity of the people—so that, on the 12th November, 1913, the inoculation state was as follows :—

"Primary inoculation	32,744
Re-inoculation	8,702"

Captain Skelton concludes :—"The vaccine used is Haffkine's prophylactic. So far as I know, not one single untoward result has followed. Considering that in many instances the operation has been carried out in not too favourable circumstances and under conditions which, if one has the choice, one would not select as highly desirable this result reflects credit on the inoculation staff for their care in trying to obtain asepsis." At the same time, even in the case of well inoculated populations, Captain Skelton shows that residence in insanitary areas affording special shelter for rats will inhibit the full benefits of inoculation :—

> "Altogether, since the disease began in Mombasa 17 cases of plague have occurred among the railway employees living in the railway area; that is to say, there is a case incidence of approximately 10 per thousand. Compare this incidence with that of the general inoculated population (all railway employees have been inoculated at least once and the majority twice), which in August 1913 was 0·3 per 1,000. It is seen therefore that if one lives in the railway area the chances of getting plague are about 30 times as great as if one lived in the town."

Aseptic Vaccination.

Dr. CRAKE, Health Officer, Calcutta, makes the following remarks in his Annual Report for 1913, on Major WALTERS' proposal to use tinct. iodine to secure an aseptic condition of the arm before inserting anti-smallpox vaccine :—

> "I was disappointed to find that Tr. Iodi alone appeared to attenuate the vaccine. This was clearly proved by its effect on a calf, one half of its abdomen being treated with iodine and the other in the usual way. The vesicles on the area treated with iodine developed more slowly, were much smaller and fewer in number, and many insertions failed altogether."

The Cocaine Habit.

With certain races in the tropics, the use of opium is largely confined to the aged and infirm, with little or no tendency to increase the daily dose. With others, undoubtedly the stimulant influence is sought by excessive and increasing doses. Legislative interference is bringing into use substitutes. In certain areas the cocaine habit is consequently being formed by the people to a most undesirable extent, whilst those who were formerly addicted to opium now find solace in morphia injections (at so much per dose) administered by the vendor with a syringe innocent of sterilization during transfer from arm to arm. Germany is the great producer of the cocaine and, under existing circumstances of its trade, persons possessed of the "cocaine habit" are liable to find their favourite drug more costly than formerly. Hence the appearance in the market of other drugs. Mr. HANKIN, Chemical Examiner and Bacteriologist to the Government of the United Provinces in his Annual Report for 1914 (p. 2) after showing that, whilst in 1906, only 5 samples of cocaine were submitted for identification, in 1914 the number was 1,306, describes how a cocaine substitute "anaesthesin" was identified by him as follows :—

> "A drop of a dilute solution of caustic soda is spread out on a glass slide and allowed to dry. If a small quantity of anaesthesin or of a salt of anaesthesin is placed on this film, covered with a coverslip and heated over a flame till it melts, then, on cooling, it crystallises with a very peculiar appearance. The crystals appear to be separated by cracks, and under the microscope are seen to contain minute cavities, often oblong in shape, and arranged in rows. No other cocaine substitute produces a similar appearance when treated in this way. Antipyrin does produce a somewhat similar appearance, but is very easily distinguished from anaesthesin by its solubility and chemical characters."

SANITARY ORGANISATION.

In the Second of the Chadwick Lectures given by Sir Ronald Ross,* the important question of sanitary organisation in the tropics was entered into. He insisted that Governments were apt to find an excuse for not taking sanitary action by laying down the principle that, until the people are educated, aid by the State would be premature. Yet he showed that, granting education of the people was a highly desirable aid to sanitary advance, it did not follow that sanitation would, or could be automatic. He holds that the value of education has failed to exhibit itself in the case of officials, who employ "non-experts for doing the business of an expert." In illustration, he showed that water offering breeding facilities for mosquitoes in localities under public control could not be got rid of by the individual parent for the protection of his child, neither could the educated parent control public sewerage, water-supplies, and public conservancy.

In sanitary interests, he deprecated the tendency in research to proceed on academic lines, and pointed to the necessity for the better direction of aid to applied hygiene.

In the matter of sanitary organisation, he held that the heads of the Medical and Sanitary Services should have positions in the Executive Councils of Government.

Finally, he referred to the common fault of regarding sanitary requirements as sufficiently fulfilled by forming Sanitary Services in which the higher grades were duly represented, whilst failing to supply the rank and file by which executive orders could be carried out.

It is a curious fact in the psychology of not a few civil administrators that they appreciate solely what may be regarded as the fireworks aspect of Applied Hygiene. They understand the physical strain and danger to life that accompanies energetic action in combating epidemics, and they see in disinfection—especially if accomplished by malodorous chemicals—the true rôle of the sanitarian. But except in this the hour of defeat (which an epidemic really means to the sanitarian) he is a negligible quantity—a faddist with the doctrine of "prevention is better than cure." Whilst then the sanitarian must ever hold in mind that, in tropical countries, the ultimate responsibility for proportionate expenditure of funds, and for preserving individuals and special races from undue interference by indiscrete exponents of Preventive Medicine, must rest with the authorities to whom advice is given, it is obviously essential in the public interest that such advice should be given under circumstances that will ensure its being duly weighed. The essence of this requirement is that all representations on sanitary matters must be made *direct* to the authority possessed of the power of government of the people concerned, and of control of the purse strings. The plea of Sir Ronald Ross that sanitation should be represented on the Executive Councils of Government is therefore to the point.

As far back as 1894 Professor W. J. Simpson, at the First Indian Medical Congress at Calcutta, suggested that sanitation should be represented on the Executive Council of the Government of India by a member of Public Health.

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* Journal of State Medicine, 1915. Apr. Vol. 23. No. 24, pp. 97–100.

Dr. W. Perrin Norris, writing in the Journal of the Royal Sanitary Institute, June 1915, p. 208, states: —

> "In some of the States the Cabinets include a Minister of Health, and in that State in which the evolution of public health administration was for some time the most advanced there has been a Minister of Health with full cabinet rank, and Medical Permanent Head, for over twenty years.
>
> "In that State, also, the central authority or State Board of Health is so constituted as to link it up with the local authorities, the Board consisting not only of Government representatives, but also of municipal councillors representing groups of municipalities, towns, boroughs and shires."

Again, if it be of advantage that representations in the interests of sanitation shall be made direct to the authorities concerned, no exception can be allowed in reference to departmental administration by interposing a man whose chief rôle is curative medicine. Curative and preventive medicine, except in petty charges, cannot without detriment one to the other be "run" by one individual. In civil administration no question of subordination need arise; but, if it does, the branch which fulfils the rôle of chief public importance, namely, the sanitary, should be supreme. Sir Ronald Ross placed this on record as his view, in a paper read before the International Medical Congress of 1913.

Not only however is the present position of the sanitarian to civil administrative officers in the tropics such as to demand change if efficiency is aimed at, but his relation with other Departments requires to be better defined. To secure that Hygiene shall be "applied" by works it is necessary that Engineering skill be employed. The engineer so used should know sufficient about sanitation to appreciate the sanitarian's requirements; the sanitarian, on the other hand, should know enough of engineering to feel assured that the works contemplated or executed meet his requirements. The engineer must therefore either be subordinate to the sanitarian or precise rulings must be in force to secure that their mutual relations are such as to obtain the best work of both, in the public interest, without such subordination. Sir Ronald Ross, in the paper referred to, considered that by subordinating both officers to government the end would be secured. This is true up to a certain point; but as these two officers may differ in opinion and are not the holders of the purse strings, it is evident that local authorities must be allowed to express their views also. Hence, Sanitary Boards with governments are now recognised factors. Provided their functions are confined to discussion and approval of the Sanitary and Engineering, financial and legal aspects of major and sanitary works, such Boards are useful, as buffers between Governments and extreme sanitary and engineering experts. The tendency is frequently, however, for Sanitary Boards gradually to usurp duties which can only be correctly fulfilled by either the Chief Sanitary Officer or the Sanitary Engineer. This can only end in delay and, finally, inefficiency of sanitary administration; and, whilst mutual consultation of all concerned on such Boards is of utility in securing compromises where huge sums of public money are involved, this will not suit the requirements of minor sanitary works.

For the latter there must be a very great demand in average tropical countries, with reference to temporary works for the sanitary care of large assemblies, the making and maintenance of antimalarial works, minor water-supplies, village conservancy makeshifts, sewerage and the like. To secure, say, the making of catch drains to divert from depressions water that would be utilised by mosquitoes or to protect drinking water sources from sewage, might imply correspondence and the scrutiny of estimates and shelving of the remedy for months if not years, if it had to be referred to the local authorities as well as the Sanitary or other Engineer. Further, if so referred, there would result an increase of establishment of Engineer subordinates *out of all proportion to cost and nature of works to be fulfilled.*

If the Sanitary Officer is to make, after a sanitary survey of a locality, suggestions for sanitary works either major or minor, he should be prepared to furnish plans and, if possible, approximate estimates sufficiently sound to render their engineering feasibility possible of discussion. Failing this, not only will delay occur in preliminary discussion, but an engineer sent to the spot alone, or even in company of the Chief Sanitary Officer, may be absolutely misled as to what is required. It follows that if the Sanitary Officer be provided with an engineer subordinate attached to his own office, he is in a position, when on tour, to suggest new major works to be elaborated in consultation with the Sanitary Engineer and to be designed and executed by that officer after a consideration by the Sanitary Board, or on his own initiative to design or correct designs of his subordinates, and to cause the execution of such minor works as are within the powers of his staff. For this end, *all the superior grades of Sanitary Inspectors*, in rural areas at least, should besides their sanitary training have undergone a course of minor engineering that would enable them to take levels and to estimate for and construct minor works.

Thus, Professor W. J. SIMPSON, in his recent "Report on Sanitary matters in the East Africa Protectorate, Uganda and Zanzibar," points out that sanitation in these areas has now become of such importance to their future economic prosperity as to require full and separate sanitary and medical staffs under separate heads, each corresponding direct with the Local Government; only when the charges are small does he suggest the "doubling up" of medical and sanitary duties, and then he makes it clear that for medical duties an officer shall correspond with the Head of the Medical Branch and, for Sanitary duties, with the Head of the Sanitary Branch of the Public Health Service. He thus deals with the important subject of sanitary works:—

> "The Chief Sanitary Officer should have an Assistant Engineer with ministerial staff as a technical assistant, who would travel with him, and be prepared to make estimates for petty works, and verify data for any sanitary engineering suggestion for major works which the Chief Sanitary Officer would desire to represent to Government. The Chief Sanitary Officer and his staff would be responsible for petty works, and it would rest with the Sanitary Engineer to deal with the estimating and execution of major works. No major works should be suggested by the Sanitary Engineer to Government, without the whole matter with plans in detail being placed in consultation with the Chief Sanitary Officer. Such major works thus discussed would pass finally to the Sanitary Board, who, with their opinion, would forward the whole scheme to Government for sanction."

The ideas therefore of sanitary organisation in the Tropics expressed by Sir Ronald Ross and Professor W. J. Simpson are not procrustean, but would seem the natural outcome of expansion in applied Hygiene in the Tropics, whilst, as remarked above, there are definite signs of the necessity of recognising that the time has arrived for a better defined position of the sanitarian, in conservative Great Britain.

There are, however, points not referred to by these authorities that become of importance in areas of the tropics where administration has sufficiently advanced to require relegation of local matters to elected bodies under self-Government rulings. Such bodies, even in Great Britain, where the principle of self-government is developed so fully, are not absolutely free of a certain amount of discretionary exercise of power by Government officials. Both in the Colonies and in India such precautions would be primarily exercised by the Chief Civil Officers of Districts. Hence, in matters of local importance financially (for instance, as to major works, or touching legal or political interests) the chief Civil Officer of the District concerned is a factor that in sanitary advance cannot be neglected—notwithstanding that these elected local bodies may have powers in deciding upon their course of action. Again, these bodies may pay from their own funds Sanitary Executive, Conservancy and Vaccination Staffs. The officers of the Government Sanitary Department may consider the work of certain members of these staffs inefficient, and may advise removal or other measures; but in this, as in all other matters, they issue no orders—they advise.

Similarly, if of the Public Health Department of the Central Government there is to be a Medical and Sanitary Branch, there must be the ability to secure professional inter-communication without subordination on either side. Thus, in the interests of Sanitary Research, it may be necessary to obtain data, or other aid, from the Medical Branch. In this there would be no more and should be (having regard to the professional spirit of medical men) less difficulty than in intercommunication with local authorities in other departments of government.

Such matters are illustrated by the accompanying diagram showing a type organisation scheme in the tropics. This is in accord with the main principles* as approved by a Resolution by the Tropical Section of the meeting of the British Medical Association in July last, in connection with a paper read for the writer.

It will be seen that there can exist no difficulty in so linking the Medical and Sanitary Branch of the Public Health Service, Local authorities and Civil Government officials that, whilst the limits of subordination remain clearly defined, the influence of both Departments on public health is in no way trammelled.

The idea of a "Ministry of Euthenics and Economics" is exceedingly elastic; so that the term is as applicable in the case of a small Administration as in that of a Government controlling an Empire. It implies that Hygiene should take its place as the great exponent of all matters connected with the well-being of man. It does not follow that every Government or Administration could be, at one period of its existence, in possession of all the Departments of Science, which such grouping implies. Nevertheless, if the aim were held steadily in view, there would be evolved, for purposes of Local

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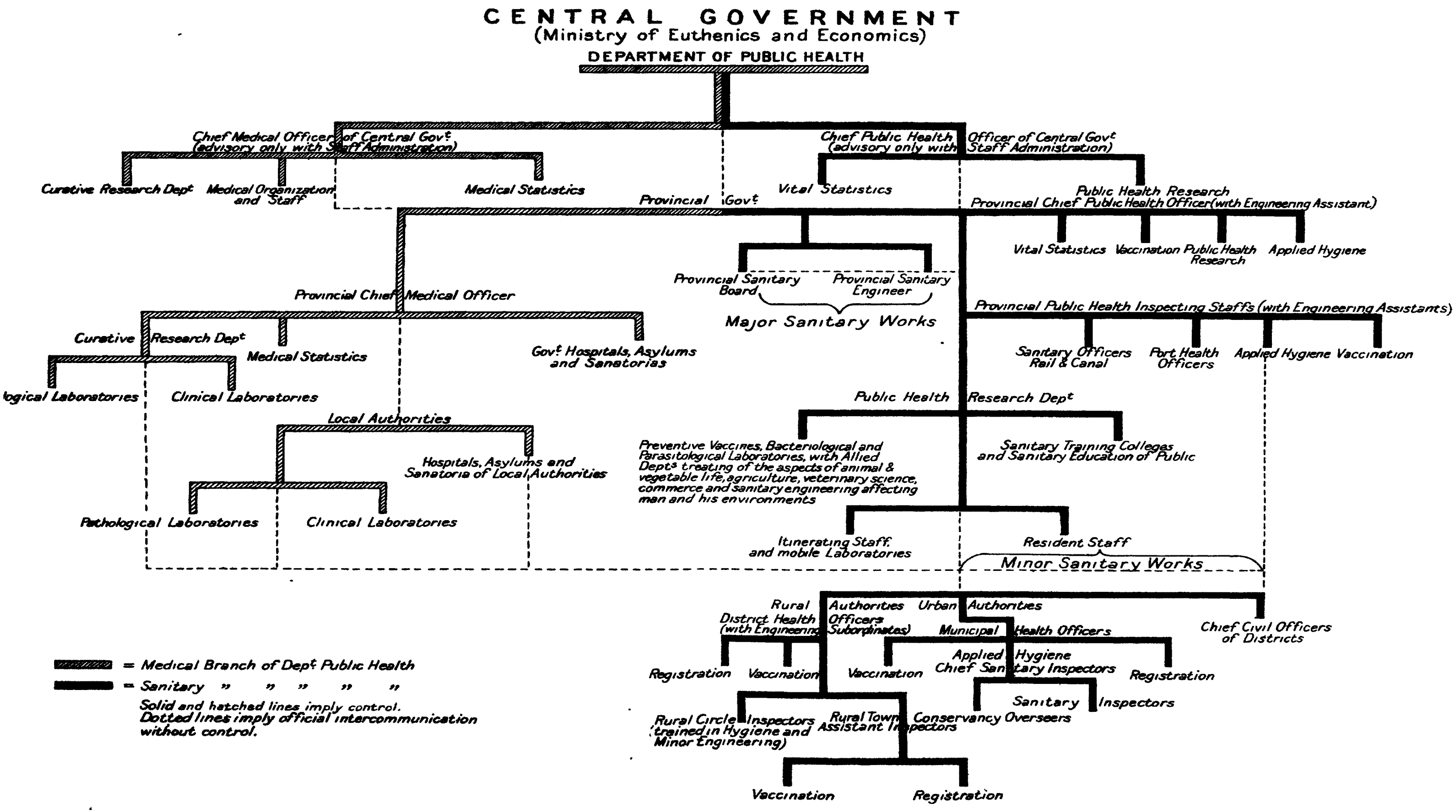
* The original diagram was not forthcoming after the meeting.


CENTRAL GOVERNMENT
(Ministry of Euthenics and Economics)
DEPARTMENT OF PUBLIC HEALTH
Chief Medical Officer of Central Govt (advisory only with Staff Administration)
Curative Research Dept
Medical Organization and Staff
Medical Statistics
Chief Public Health Officer of Central Govt (advisory only with Staff Administration)
Vital Statistics
Public Health Research
Provincial Govt
Provincial Chief Public Health Officer (with Engineering Assistant)
Vital Statistics
Vaccination
Public Health Research
Applied Hygiene
Provincial Sanitary Board
Provincial Sanitary Engineer
Major Sanitary Works
Provincial Chief Medical Officer
Curative Research Dept
Medical Statistics
Govt Hospitals, Asylums and Sanatorias
logical Laboratories
Clinical Laboratories
Local Authorities
Hospitals, Asylums and Sanatoria of Local Authorities
Pathological Laboratories
Clinical Laboratories
Provincial Public Health Inspecting Staffs (with Engineering Assistants)
Sanitary Officers Rail & Canal
Port Health Officers
Applied Hygiene
Vaccination
Public Health Research Dept
Preventive Vaccines, Bacteriological and Parasitological Laboratories, with Allied Depts treating of the aspects of animal & vegetable life, agriculture, veterinary science, commerce and sanitary engineering affecting man and his environments
Sanitary Training Colleges and Sanitary Education of Public
Itinerating Staff and mobile Laboratories
Resident Staff
Minor Sanitary Works
Rural Authorities
District Health Officers (with Engineering Subordinates)
Registration
Vaccination
Rural Circle Inspectors (trained in Hygiene and Minor Engineering)
Rural Town Assistant Inspectors
Vaccination
Registration
Urban Authorities
Municipal Health Officers
Vaccination
Applied Hygiene
Chief Sanitary Inspectors
Registration
Sanitary Inspectors
Conservancy Overseers
Chief Civil Officers of Districts
= Medical Branch of Dept Public Health
= Sanitary " " " "
Solid and hatched lines imply control.
Dotted lines imply official intercommunication without control.

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Governments, as the Departments concerned came into being, such a Ministry—as distinct from the organisations which undertake the financial, judicial, political, and administrative functions of Governments. Under such arrangements the Departments of Agriculture and Mycology, Irrigation, Forests, Veterinary Science, Industries and Commerce, Pisciculture, Geology, Education, Entomology, Agricultural and National Insurance would be brought into natural relation and easy communication with the Department of Public Health and each other.

A BUREAU OF PUBLIC HEALTH.

About the desirability of increasing the facilities for education of the public in sanitary matters, there can be no division of opinion. As shown in the recent Chadwick Lectures by Sir Ronald Ross, however, there exists no reason why the sanitarian should be subordinated to the pedagogue. Consequently, the growing interest of the public in sanitary matters is being met by various expedients. For example, at the present time, the Sanitary Commissioner for Madras (Major JUSTICE, I.M.S.) has, at the request of the Madras Government, prepared a series of lectures suitable for popular audiences, which will be liberally illustrated by topical lantern views illustrating sanitary defects and their method of remedy. These will be delivered by several lecturers simultaneously throughout the country. An important point in the programme is that lay members of self-government bodies will be thus reached.

To systematise this method of education, Surgeon-General BANNERMAN, C.S.I., in an able lecture before the Indian Science Congress at Madras in January of this year, after advocating the necessity of not only encouraging research but giving research workers a living wage, made a special plea for the establishment of a Bureau of Public Health. He stated:

> "But we not only require research workers, we want an organisation that will help to educate the people in the ordinary rules of health. There should be in each Presidency an official whose business it is to look after the hygienic education of the common people. He should be in charge of a Bureau of Public Health, and his work should consist in preparing pamphlets and popular lectures with lantern slide illustrations which could be lent to lecturers who would undertake to itinerate in the villages and talk to the common people. He should organise classes for the teachers in our Teachers' Colleges and he should gather together and popularise information from every quarter."

SANITARY RULINGS.

ALCOHOL.

The "what is whiskey?" cry which accompanied a few years back the question of what is "pot" and what "still" spirit, is likely to be complicated by the scientific tradesman rendering spirit which has been denatured sufficiently physically fit to pass as wholesome. The Government of Madras have found it necessary to make a special enactment on the matter (Madras Act, No. 1 of 1915) as follows :—

"The following shall be substituted for section 55-A :—

"Whoever renders or attempts to render fit for human consumption any spirit, whether manufactured in British India or not, which has been denatured, or has in his possession any spirit in respect of which he knows or has reason to believe that any such attempt has been made, shall on conviction before a Magistrate be liable to imprisonment for a term which may extend to three months or to fine which may extend to one thousand rupees or both. For the purpose of this section it shall be presumed unless and until the contrary is proved that any spirit which is proved on chemical analysis to contain any quantity of any of the prescribed denaturants is or contains or has been derived from denatured spirit."

* * * * *

"In section 3 of the said Act the following amendment shall be made :—

"For the existing explanation of the term "denatured" occurring at the end of sub-section (8) the following shall be substituted :—

"*Explanation.*—'Denatured' means subjected to a process prescribed by the Local Government by notification for the purpose of rendering unfit for human consumption."

ANTI-MOSQUITO MEASURES.

Egypt* possesses a ruling as to anti-mosquito measures which has the merit of being optimistic, if not uncommon. Relying upon the determination of citizens to get rid of mosquitoes and therefore upon willingness to pay for their abolition, the destruction of larvae is effected by the Inspectorate, a fee being charged by the Department for each house dealt with. There is also a provision in the ruling that the amounts collected shall pass to "the general revenue of the State, the cost of the measures being borne by the prophylactic fund. The extent of the operation is therefore at present necessarily limited to the amount of this fund which can be spared for the purpose, the increased fees which would be derived from a more extended application of the measures not being available for such extension." The general result of the ruling is to limit action to scattered houses and as "the mosquito, though not a great traveller, is unfortunately not sufficiently domesticated to confine her attention to the immediate locality in which she is bred," the results of anti-mosquito measures are described as not attended with "marked success."

BY-LAWS FOR WATER-WORKS.

The following by-laws have been suggested by the Sanitary Engineer, (Mr. HUTTON) to the Government of Madras (G. O. No. 139 M, 1st February, 1915) :—

"Every application for the supply of water under sub-sections (1) and (2) of section 147 shall be made to the Chairman in writing, signed by the applicant and so far as may be in form A hereunto annexed ; and the work necessary for such supply shall not be commenced until the applicant has deposited the estimated cost of carrying it out with the Municipal Chairman. The estimate will be fixed by the Chairman and if he thinks fit he may prescribe a time within which the deposit shall be made.

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*Annual Report for 1913, Dept. of Public Health, p. 69.

"2. Each house to which water is laid on shall be provided with a separate service pipe connection and a stop-cock and meter. No house will be supplied with water from the service connection of any adjoining house or premises.

"3. The diameter and the character of the service and communication pipes, and the number, size and kind of stop-cocks or taps shall in all cases be determined by the Chairman.

"4. *The permissible free allowance under sub-section 1 of section 147 shall be as follows:—

Houses of the rental value per annum of				Daily allowance in gallons.
Below Rs.	30			30
Above Rs.	30	up to Rs.	50	50
„	50	„	100	80
„	100	„	150	100
„	150	„	200	120
„	200	„	250	140
„	250	„	300	160
„	300	„	350	180
„	350	„	400	200
„	400	„	700	220
„	700	„	1,000	250
„	1,000	„	1,500	300
„	1,500	„	2,000	350
„	2,000	„	2,500	400
„	2,500	„	3,000	450
„	3,000			500

NOTE.—The allowances of the first three items refer to existing house-connections—*vide* by-law 5 below.

"5. *There shall be no house-connections in the future for houses whose annual rental value is below Rs. 100.

"6. *The charge for excess water shall be regulated at the rate of As. 12 per 1,000 gallons of excess water consumed over free allowance as per scale in the preceding by-law in the case of domestic supplies and Rs. 2 per 1,000 gallons for supplies for non-domestic purposes.

"7. The Municipal Chairman† may, by general or special order, direct that any private latrine, privy, urinal, or water-closet which is supplied with water from municipal water-works shall be provided with a cistern of such size and description as it may prescribe.

"8. Every boiler for generating steam which requires water from a municipal source shall be supplied with water from a cistern and not directly from the service pipe, and every such cistern shall be supplied with a ball-valve, a detective or warning pipe and proper means of access for inspection thereof.

"9. The Chairman may at any time remove any fitting connected with the water-works for the purpose of examining its condition or for repair.

"10. No person shall wilfully or negligently allow the water from a standpost or public water tap to run to waste.

"11. No person shall use the water from the standposts or public water-taps for the washing of clothes, animals or vehicles or for bathing purposes.

"12. No person shall, without the express permission in writing of the Municipal Chairman, use water derived from the standposts or public water-taps or fire-plugs for any building, gardening or agricultural operations or for the purpose of any manufactory.

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* Not yet sanctioned by Madras Government; under consideration.

† The writer considers the word "may" would suitably be substituted by the word "shall," in so evident a sanitary provision.

" 13. No person shall so manipulate the standposts, or public water-taps, or fire-plugs as to secure a continuous flow of water for any purpose except for the extinction of fire.

" 14. Except in the case of fire, no person not duly authorised by the Municipal Chairman in that behalf shall, within municipal limits, open or in any way interfere with any main or pipe or valve or fire-plug connected with the municipal water-supply."

Specification Report issued by the Madras Sanitary Board (*No.* 174-*S.*, *dated* 4*th March*, 1914) *for a House Connection with ¾-inch Water Meter.*

" *General.*—The house connection shall consist of (1) a length ¾-inch galvanised wrought iron service pipe and connections complete, (2) a masonry chamber to locate the stop cock and meter and measuring 3′ 6″ × 3′ with a wrought iron cover plate and (3) a ¾-inch water meter with all accessories complete. The dispositions of the pipe, stop cock, meter and pit shall be as shown in the design.

" 2. *Service pipe.*—This shall be ¾-inch size. The main in the street shall be tapped and a straight ferrule inserted and connected with couplings and back nuts to a suitable length of ¾-inch galvanized wrought iron pipe, on which the stop cock and meter shall be fixed, as it crosses the pit. The piping shall then be continued till it reaches the house, crossing the roadside drain on its way as shown in the type design.

" 3. *Meter-pit.*—This shall measure 2′ × 1′ 6″ inside and shall be located six inches from the outer edge of the roadside drain towards the centre of the road. The excavation for the pit shall be one foot four inches deep, of which the first six inches shall be filled in with concrete, broken brick in chunam and the remainder shall be built with brick in chunam 9 inches thick. A cutstone coping 9 inches broad and 4 inches deep shall be built over this brick masonry. A suitable slope at the outer edge and a recess all round the inner edge to receive a cover shall be formed on the top of the coping. The interior of the pit including floor shall be plastered with best Portland cement mortar (2 to 1) half an inch thick. There shall be a wrought iron cover plate with necessary locking arrangement as shown in the design.

" 4. *Meter.*—This shall be Tylor's patent ¾-inch rotary water meter, or other approved type, and shall include strainer, unions for ¾-inch galvanized wrought iron tubing with necessary bolts, nuts, washers, etc., complete, similar to illustration on page 243 of Messrs. Tylor & Son's catalogue, 18th edition."

TREATMENT OF WASTE.

COLLECTION OF EXCRETA.

Where it is desired to abolish the "salga" or "choo" in favour of night soil conservancy of any description, in deciding means for collection and transport the question of bulk and weight of excreta necessarily arises. The data for dealing with a population on mixed diet such as that used by Europeans are, of course, well known, and calculations from these, allowing for the increased bulk of the excreta of a population living chiefly on vegetarian diet, can readily be made. But as to what is the bulk that must be allowed for there is some difference of opinion. Edmund PARKES laid down that the Hindu, as a typical vegetarian, passed from 12 to 14 oz. of faeces daily. Urine may be accepted as at 40 oz. per day.

Assuming that the smaller amount (12 ounces) of faeces is the rate per head per day, in calculation for an average population of mixed ages and sex 30 to 35 per cent. should be deducted. At 30 per cent. deduction, the average product of a mixed adult population will amount to 8·4 ounces per day or ·00998 c. ft. per head. Therefore for 1,000 of a mixed population there will be 9·98 c. ft. of faeces and, allowing 40 ounces per day of urine, there will be ·04000 c. ft. per head, or per 1,000, 40 c. ft. Hence, the urine and faeces of a mixed vegetarian population may be calculated at 49·98 per 1,000.*

Approximately, therefore, a mixed vegetarian population would yield 10 c. ft. of faeces only, and 50 c. ft. of combined liquid and solid excreta for 24 hours, per 1,000.

From the above data can be reckoned the number of buckets, or other receptacles of which the cubic capacity is known, required for any number of men using latrines, if there be allowed for each man for defecation five minutes. Galvanised iron pails, such as are largely used for conservancy, differ in size but the commonly available pail in the market is of 3 gallons capacity. To remove a filled bucket and replace it by a clean one, would take about two minutes.

In estimating the numbers who will resort to public latrines, provision need not be made for the total in the area conserved, it being evident that infants, the sick, the permanently infirm and, where a race system of withdrawal of females from the public gaze exists, females may be deducted. This deduction must differ greatly with localities; but it is probable that a fair average would be 20·5 per cent. But the great difficulty in fixing the number of latrines, and seats in these, is with reference to the fact that their use cannot reasonably be distributed over, say, an eight-hour labour day. An estimate which is by no means liberal would be that whilst a certain amount of resort to latrines will occur towards the evening (with Hindus, for example,

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*In 1906 Captain A. W. GREIG, I.M.S., conducted, at my request, in Mandalay Jail, of which he was Superintendent, careful experiments (verified by repetition) with the object of ascertaining the difference, if any, between these results and those for Burmans. He found the following result:—*Burman male adults per* 1,000: Faeces 18·7 c. ft.; urine 55·856 c. ft., or a total of 74·556 c. ft. Hence, if 35 per cent. be deducted for a mixed population, there results 48·461 c. ft. or if 30 per cent. 52·190.

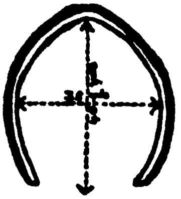
a twice daily resort being frequent) sufficient space must be available for a labouring population within three hours of daylight. If both urine and faeces be received in one bucket, with the data above given it will be found that 795 persons of a population of 1,000 will require 83 buckets to be used in three hours. In any system which will dispose of the urine separately, however, the faeces could, in the same time, be received in 24 buckets.

DISPOSAL OF SULLAGE.

In his paper read before the Institution of Civil Engineers, to which reference is made under the heading of "Malaria" in this number, Mr. EVANS showed that, where subsoil drainage was close to labour lines, it could be utilized for sullage water disposal and thus economy be secured. In this he followed the well-known method of sub-surface disposal which is of utility in readily permeable soils. The masonry sump into which the sullage is led for entrance to the subsoil system, he fills with gravel, thus securing a "roughing filter," and therefore greatly aiding the efficiency of this method of disposal by prevention of choking.

THE INCINERATION OF RUBBISH.

In dry weather in the tropics, in localities sufficiently distant from habitations, disposal of rubbish by incineration in the open may frequently be practised with advantage. The following method*, which was recommended by General GASELEE in a Departmental Order some years back, seems to the writer both simple and efficient :—



"In a convenient place an earthern parapet, shaped like a horse-shoe, is thrown up two feet high. The litter is brought in by the entrance, on donkeys, in bags, etc., etc. Sweepers with forks spread it out inside, to dry. Thereafter, it is gradually thrown over the parapet all round, and set fire to *outside*. Practically the fire never goes out. Ashes accumulate, and the outer ring rises, whilst the interior slope also increases. Three sweepers can-work a kiln 120 ft. by 105 ft. and this has been found enough for 2,000 animals, and lasts for several months. As the sweepers work all day, it saves labour to use one large kiln, instead of two small ones."

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*Method of disposing of litter at Khar Malakhand Force.

SANITARY WORKS.

SUBSOIL DRAINAGE.

The Report of the Malaria Advisory Board, Federated Malay States, for 1913 shows that in Kuala Lumpur from 1907 to 1911 the average malarial death-rate was 9·5 per mille. In 1911, anti-malarial drainage was sufficiently carried out to have influence. In 1912, the rate dropped to 4·2 per mille. The experience of the Advisory Board, gathered from anti-malarial measures in all parts of the Malay States, leads them to lay down rulings (p. 54) with which none but extreme supporters of the "all-quinine" policy are likely to disagree :—

> "(*a*) Land drainage and cleaning of drained areas ;
>
> "(*b*) Reduction of breeding in lakes, rivers and other large bodies of water, by removal of weeds and algae from shallow places ;
>
> "(*c*) Removal of bottles, tins, boxes, shells or any other waste articles likely to hold water, and the screening of all tanks, wells or water-containing vessels ;
>
> "(*d*) Periodical use of oil or larvicides on breeding places not otherwise dealt with ;
>
> "(*e*) Efficient upkeep of all anti-malarial works."

They by no means neglect the full distribution of quinine as an adjuvant. They make a definite statement of their experience of its use as follows :—

> "The Board took steps to further the distribution of quinine wherever malaria is prevalent, and particularly in places far from hospitals or dispensaries. It was considered that tabloid quinine bihydrochloride was the best form for general distribution, and a large supply was obtained in tubes each containing twenty 4-grain tabloids, with a printed wrapper giving directions for its use in English, Malay and Tamil characters. . . . Very favourable reports have been received of its use, and it seems to be in great demand."

Dr. Malcolm WATSON has laid down that in the Malay States by means of surface drainage "in low lying alluvial clay soil with a high ground water" and the cutting of jungle (conjoined with drainage), surrounding inhabited areas, it has been possible to practically extinguish malaria throughout 500 square miles. When, however, he attempted to deal with hill country possessed of numerous ravines, difficulty was experienced, until he excogitated a modification of subsoil drainage. The latter method has bulked largely in the works adopted by the Advisory Board in respect to Kuala Lumpur, as well as the drainage and filling of swamps.

Although the application of subsoil drainage to land is in all respects a simple engineering procedure demanding little but ordinary care, as applied to ravines it really approaches largely an elaborate system of interception drains. This, under the varying circumstances of levels, rocks and soil dealt with, implies a great deal of personal attention to details.

On work of this nature Mr. EVANS, the Executive Engineer of the Advisory Board, must have acquired unique experience. In a paper read before the Institute of Civil Engineers, he showed that he relied upon ordinary agricultural tile drains for the prime receiving points. These he considers should not be of less diameter than 4 inches, as he found smaller drains liable to choke. The object held in view was the rendering dry of the swampy bottom of ravines, during the period when they do not serve for the " run off " of storm water. The writer suggests that this means that notwithstanding the steep gradient of these ravines, at certain points subsoil flow meets with obstruction with the result of causing the underflow or substream to accumulate. Hence, apparently, the variety of methods found necessary in executing the work. At one time subsoil drains, doubtless acting as intercepting drains, were required on both sides of a ravine, at another these would be necessary on one side, or, in the centre, a pipe or open drain would be indicated. These pipes Mr. Evans advises should be laid " at a depth of 3 to 4 feet (or deeper on steep slopes) on a carefully graded trench bottom, and covered with palm leaves or long grass, should palm leaves not be available" and then filled over with earth, or failing earth the more friable surface layers of clay. As usual in such work, gravel covering of joints is employed when available. These unglazed agricultural tile drains were laid open-jointed, and discharged into main drains of from 4 to 8 inches diameter. As in the case of sewerage works, drains were laid from the point of discharge to the higher levels. All pipes were made locally, and, as there was no more expert skill available than in average tropical countries, there is no reason why the example of the Malay Advisory Board should not be largely followed. In any case, machines for making agricultural drains by hand power are cheap. The firing of the pipes should be well within the skill of an average Asiatic potter*. Where the gradient was such as to secure suitable velocity, for prevention of mosquito breeding, open main drains were employed. These were of cement concrete formed in wooden moulds, and were laid with open joints. Mr. Evans claims that this is preferable to using fixed joints and weep-holes, which he considers " often permit mosquitoes to breed in the water in or behind the holes."

Having laid down drains in ravines subject to the velocity of storm water, the question of maintenance is of much moment. In the absence of special precautions, they may well be laid bare by scour and be displaced. Discussing this, Mr. Evans states that where drains pass through " double rock cuttings, small masonry drains or cut-off walls are needed to prevent wash-outs." The best lining for the ravine surface has been proved to be grass " kept close cut, the surface being cut and filled, or caused to fill by silt-deposits to an even slope." If the gradient is more than 1 in 10, the turf is invariably pegged down. He adds that the whole question of the protection of ravine surfaces depends on the quantity of silt carried by flood water ; and the method to be used depends on the condition of the hill sides from which silt may be washed. " The turf banks or drains are often used to cause a drained ravine to silt to an even slope or to arrest silt."

It will be seen that a certain quantity of the silt torn from the hills by the heavy rainfall is duly utilised in levelling portions of the ravines. But it is evident the cost of maintenance would be greatly reduced, if it were possible to decrease the velocity of flow of the storm water in the ravines. The writer suggests that this end might be greatly aided by more extensive use of silt than stated by Mr. Evans. It should be possible, at certain points of such ravines, to lead the storm water from them to distant points, where the process of terracing in agriculturist interests, as advised by Sir Edward BUCK, could be pursued with advantage. Selection of sites in reference to inhabited areas, and the judicious use of drainage so as to lead back the water free of silt to the ravine, ought to prevent dread of creating mosquito breeding places. It is also conceivable that at certain, possibly rare, points (depth below ground level and nature of subsoil being favourable) instead of following with great labour the sides of a ravine, it would pay to regard it as the main drain of a subsoil drainage system, and to use, in herring-bone pattern, minor agricultural drains extending on both sides at long intervals, so as to intercept the subsoil water and deliver it into a central drain.

---

*Probably in countries where the rainfall may be less heavy than in certain parts of the Malay States, the use of minor drains of the large diameter of four inches, as found necessary by Mr. Evans, might be dispensed with.

Mr. Evans estimates that the total cost of thoroughly draining hill lands in the Malay States will not exceed £4 4*s*. per acre of gross acre drained. In this estimate, he allows for pay of Tamils at 10*d*. and Chinese at 1*s*. 6*d*. per diem. For the first year after completion he would allow for maintenance ten per cent. of the first cost, and five per cent. in subsequent years. In the Kuala Lumpur anti-malarial work, 3,000 acres were drained. Excellent as the results have been, in decreasing the incidence of malarial fevers, the full effect cannot be expected until the filling of a swamp—now in progress by the local Department of Public Works—is completed.

WATER-WASTE PREVENTION.

In Great Britain, the legal control of companies which possess waterworks and supply water within the areas of public bodies is sufficiently complete to ensure that waste of water is much less likely to occur than in most of our tropical possessions, where waterworks are ordinarily the property of local authorities. When to the very normal tendency to careless waste of water is added the difficulties of privacy enjoined by the caste system found in India, the matter is liable to become of serious public importance, not only in the interests of prevention of pool formation and waterlogging of the soil but as representing useless expenditure of funds which are raised by taxation. The economic aspect of the subject is particularly acute in places where the whole supply is dependent upon pumping, as every gallon raised represents a definite sum expended. Even in gravitation systems, with a public body in charge possessed of a determination to please the ratepayers, the right to waste may be conceded by reckless extension of private services; with the natural sequel that pressure falls at certain points and general grumbling as to inefficiency of the water works and of the whilom popular authorities is brought about. Moreover, once a haphazard method of governing a water supply is introduced great difficulty will be found in securing reform. The members of local bodies are themselves householders, and it becomes difficult for certain of them to realise that when they have for years been allowed to use as much water as they liked, they should suddenly be subjected in their private capacities to discipline in the public interests. Hence, it is apparent that, to prevent disease and unnecessary taxation, methods of control of waste in public water supplies should be excogitated, and be capable of legal enforcement—not after some years' experience of how *not* to manage waterworks has forced the necessity for action upon a public authority, but as a part of the scheme on introduction.

In the Madras Presidency, the District Municipalities Act confers the power of regulation of water supply upon municipal councils, and although frequently the subject of advice by both Sanitary and Sanitary Engineering Officers, the methods followed in various localities have, in course of time, become so varied that the Madras Government has thought it advisable to secure the adoption of by-laws that will afford more uniform methods. The Sanitary Engineer to the Madras Government, Mr. W. HUTTON, has accordingly submitted draft rulings (G. O. No. 139 M, 1st Feb., 1915) which have in the main the approval of the Madras Government. Certain of these are reproduced under "Sanitary Rulings" in this number.

The principles, as finally approved by the Madras Government, include the right of a Municipal Council to refuse a new house connection in future unless a meter is attached to it. From this ruling, it follows, according to the Madras Government, that "it is necessary to prescribe a minimum limit to the size of houses which should be granted house connection even with meters." This principle is doubtless correct; but the Sanitary Engineer expands it by advising the classification of houses founded on their rental values, so as to permit certain amounts of "free water" without charge, above which an amount payable by meter measurement would be enforced. This suggestion of the Sanitary Engineer is not at present sanctioned, as the existing laws will not cover it, but the Government promise consideration of amendments to this end. The amount the householder will pay in various towns is not to be fixed by the Councils with regard to actual cost (which would be greater in towns supplied by pumping than by gravitation systems) but the standard rate of 12 annas per 1,000 gallons is laid down.

All connections are required to be according to type designs prescribed by the Sanitary Board, and a definite ruling is laid down that no new house connection is to be made with any main or branch "in which the average pressure is less than ten feet above ground level during the hours of maximum demand." A further useful decision is as follows:—

> "As regards additional street fountains on existing mains, the Government agree with Mr. Hutton that the larger the number of street fountains the less will be the demand for house-connections and consequently the less the probability of wastage of water. Municipal councils will accordingly be permitted to sanction estimates for erecting such fountains, provided that they are in accordance with type designs 113-A and 113-B issued with Sanitary Board's Proceedings No. 374-S, dated 19th October, 1911, but no fountain should be erected on new pipe lines, nor on existing lines specially extended for the purpose, without the approval of the Sanitary Engineer or the Deputy Sanitary Engineer in charge of the circle, even when the estimated cost is below Rs. 500. It is necessary to prescribe this restriction because it has been found in practice that councils acting without expert advice have not infrequently spoiled their distribution systems and the water by putting in pipes of wrong sizes or by allowing dead-ends without scour valves."

Whilst the above rulings are made applicable to the 25 District Municipalities in possession of public water supplies, the method sanctioned in Madras City is somewhat different. Writing in the "Indian and Eastern Engineer" (Calcutta) April, 1915, Mr. Madeley, M.I.C.E., the special Engineer for the Madras Corporation, describes the arrangement adopted in the water works recently remodelled by him :—

> "Connections are allowed only to 'pucca' houses that are assessed at or above a value to be settled from time to time by the Standing Committee.
>
> "Each Service starts with a brass ferrule in the water main and is provided with a brass screw down stop cock in the road.
>
> "Lead or iron pipes may be used, but if the latter they must be properly protected from corrosion when laid in earth.
>
> "Two classes of connections have been adopted, namely, 'first class' and 'second class.' The *second class*, which will apply to the bulk of the population, enables a householder to have his own taps, provided they are placed in such positions that they can, at all times, be inspected by the Municipal staff. No second class service will be of larger bore than half an inch. Anyone desirous of having a supply which is not open to inspection without notice may have a *first class service*, which is subject to the following conditions :—
>
> "(1) The householder is required to hire water meters placed at his disposal by the Corporation, to adopt specified fittings, and to secure approval of the position of pipes and taps.
>
> "(2) He obtains a free supply of 160 gallons per month for every rupee of rent with a minimum free allowance of 3,000 gallons per month.
>
> "(3) A charge of 12 annas per 1,000 gallons is made for all water used in excess of the free supply."

The writer thinks the scheme advocated by Mr. Madeley is more suitable for adoption in a tropical city (especially if containing persons with caste or racial prejudices) than that now arranged for District Municipalities. The concession, however, made for first class service seems far more liberal than necessary, especially when dealing with so limited a supply as 25 gallons per head, on which the Madras City supply (under pressure of economy) was reckoned. Moreover, there is no obvious advantage, putting such consideration aside in the second or third class service, in bringing house rental as a factor into the first class service ruling ; beyond specifying the character of structure and minimum value of a house that will be accepted for a special or "first class" service. For example, according to the system advised for the District Municipalities, if the inhabitants per house be taken at 5 (a sufficiently correct average for the Madras Presidency) a householder paying a rental of Rs. 30 per month would receive only 6 gallons per head free. This may bear some proportion to the tax he pays for water supply but *in seeking for such a proportion all sanitary dictates are discarded.* Whether a householder be rich or poor, he should be encouraged to use water up to the limit that would imply a correct standard of personal and domestic cleanliness, and this limit*, it is presumed, all correctly designed water works afford.

In temperate climates, more water may go for the cleansing of a large house and various utensils than of a small house, but the personal habit factor in persons of the same caste or race in the East will differ very little. However this may be, the man with the Rs. 30 house pays for his fair proportion of the water supply, which is fixed for a town not on the basis of supplying the poor with one amount and the better class with another, but that the use of a certain amount of water per individual is right and proper. The principle is followed in respect to the second and third class service of the Madras City, by providing in one case a sufficiency of public hydrants and, in the other, by allowing to any person desirous a personal supply on his payment of necessary expenses, and on condition that the service tap is so placed that it should be open to inspection at all hours by the inspecting staff.* These two services secure all that is required in the public interest, in that waste is effectually prevented by their being open to inspection, and the individual served (so long as waste is not proved) may use all the water that can get through (say, in a Madras City second class service) a half-inch pipe in 24 hours. Rightly a person who requires not merely to use the supply judged to be necessary for sanitary requirements but to employ water as a luxury and, as an accompaniment of that luxury, demands its use in such privacy that the fact of waste may be concealed should, in the public interest, be made to show actual consumption, beyond the average he is entitled to in common with all the payers, by the use of a meter. But the writer fails to see that the average per head supply should be exceeded in favour of the richer members of a community as suggested in the by-laws (para. 4) shown under Sanitary Rulings. It might be said in defence of such a system that the house which pays the greater tax does so because it possesses much space, and therefore would ordinarily contain the greater number of human beings. But both these arguments are fallacious; the tax is proportionate for all, and large families are not the prerogative of the rich.

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*This standard must exist, irrespective of sanitary sufficiency, in relation to locally available sources, and the demands for trade, municipal purposes and unavoidable waste.

Failing the troublesome adjustment by actual enquiry of a house population in each case, the writer considers that the only just and sanitarily safe procedure is to hold that a house contains the average number of inhabitants as proved by the Census for the town in question and, where a "first class" supply is given, to allow free of charge the standard supply for domestic purposes of this particular waterworks, multiplied by the average inhabitants; beyond that all water, as found by meter measurement, should be charged for. There would then be for each town a standard free allowance per house of whatever rental.

TOWN PLANNING.

At the Conference of the Victoria League at the Imperial Health Conference, London, Mr. Raymond UNWIN read a paper an extract from which is selected for special notice by "Indian Engineering" (Calcutta) of February 13, 1915, in an article on town planning. This treats of an aspect of the ownership of land in regard to town improvements which is frequently lost sight of, and should be of interest to those engaged in development of our Colonies in the tropics:—

"The first instance we will take from an English town, assuming land worth, undeveloped, £500 per acre. It will be seen that with 340 houses to the area of 10 acres, each plot would contain 83½ square yards; the cost would be represented by a ground rent of 8*d.* per week and the price of the land per square yard would be 10*s.* 4½*d.* If the number of houses is reduced to 152, the size of the average plot will be increased to 261¼ square yards, more than three times the former area, the equivalent ground rent will only go up to 11¾*d.*, while the price per square yard will drop to 4*s.* 9¼*d.* Here it will be seen that without any change in the original land value, it is possible, economically, to have the use of 261 yards of land for 11¾*d.* per week instead of having only 83 yards of land for 8d. per week. Surely in buying no other commodity are we so foolish as in the purchase of land! I am quite sure that it would be very difficult for any of us to persuade a child of seven to give 8*d.* at one shop for 83 marbles, if at another he could buy 261 for 11¾*d.* It seems therefore that this overcrowding is somewhat foolish from the tenant's point of view; let us look at it from the landowner's point of view. The particular town to which these figures as to cost of land and roads refer is adding to its population 17,000 people each year; with an average of five persons per house this means that 3,400 houses are required each year. Assuming that the whole of the development takes place at present on the basis of 34 houses to the acre, the landowners around that town will be selling 100 acres each year of building land. If we assume that the value of that land for agricultural purposes is £50 per acre, the total increment from this 100 acres sold at £500 per acre would be £45,000. If a town-planning scheme were to limit the number of houses to the acre to 15, as in our second example, to house the same number of people would require 227 acres; if these were sold at the same price, and we have seen that the tenants would be getting cheaper land even so, the total increment after deducting the value of the agricultural land would amount to £102,150. So that, in this particular instance the folly of the landowners in allowing their land to be overcrowded would seem to be depriving them of £57,150 per annum of increment value. If, instead of asking the same price per acre for the raw land, the owners as a class were to be content with the same total increment value from the conversion of agricultural land into building land due to the growing population each year, they would, under the new system, be able to sell their land at £250 per acre, and yet be as well off as they were under the overcrowded conditions, while the effect of this reduction in the cost would be to give to the tenant his plot of 261 yards of land for 8½*d.* per week in place of his 83 yards for 8*d.*, or to enable him to buy it for 3*s.* 6*d.* per yard instead of having to pay 10*s.* 4½*d.* per yard. But this is not an extreme instance."

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*This would ordinarily imply the placing of a tap in a verandah facing the public thoroughfare, guarded by a wire gauze box of which the householder would have the key, and thus prevent handling by outsiders.

VITAL STATISTICS.

The Fallacy of the Total Death-Rate of Towns.

Vital statistics should afford a test of the influence of applied hygiene on populations and, perhaps, in no way could the lesson they teach be more forcible than in contrasting the length of life of various sections of a people living on practically the same soil under similar climatic conditions. This method is pursued by Dr. Crake, Health Officer, Calcutta, in his Annual Report for 1913. He shows that in Wards inhabited by soldiers, or officials who have the opportunity when sick of being sent to swell the mortality of England, or, again, where in business portions of the City young males predominate, the Annual death-rates vary from 6·4, 11·5 to 13·3 per mille. He however sums up consideration of these particular populations by stating: "Making every allowance for the abnormal constitution of the population of these wards, however, there can be no question that their superior sanitary condition plays a very important part in reducing the mortality rates. I am quite sure that if their respective populations were moved *en masse* to the more insanitary quarters of the City, nothing like these rates would be recorded." Having eliminated these exceptional areas, he makes the following contrasts:—

Wards.	*Mortality per mille.*
Kidderpore	42·6
Entally	33·2
Beemapooker	35·9
Puddopuker (suburban)	32·2
Ballygunge	32·2

The general death-rate amongst females was 39·4 per mille compared with 24·3 amongst males. In one Ward, the rate for females was 48·2 per mille. In six other Wards the respective rates were 41, 40·6, 45·7, 41·1 and 43·7. Dr. Crake then states:—

> "These figures constitute a terrible indictment of the purdah system. Surely, the women of India have a right to demand the abolition of a custom which means premature death to so many of them. Intolerably bad as the housing conditions are in many of the slums of Calcutta, it is only when the inmates are constantly exposed to these insanitary surroundings day and night, that they suffer so severely. Amongst males, who can escape during the day, the rate of mortality is little more than half that amongst females. . . . To secure privacy, efficient lighting and ventilation are absolutely disregarded, the zenana, or women's apartments being usually the most insanitary part of the house. No wonder that tuberculosis, which thrives in damp, dark, airless corners, plays havoc in the zenana."

In the matter of age at death, females in Calcutta again suffer disproportionately, as Dr. Crake states:—"As the rates of 40–50 years and 50–60 years are almost identical for the two sexes, it is clear that the heavy mortality amongst females at child bearing ages is intimately associated with the risks of child birth and with the debilitating effects of prolonged lactation, and the strain, pecuniary as well as physical of bringing up a succession of children."

The total death-rate for Calcutta for 1913 was 29·2 per mille, in itself a heavy rate; but Dr. Crake's dissection by Wards and sex shows how great extremes are concealed by rates which take into consideration only the total population of different constitutions, living under vastly different sanitary conditions.

WEST AFRICA.

A graph showing the vital statistics of non-native officials during 1914 has been recently published in a Parliamentary paper [Cd. 1871]. This represents the advance in life-saving between 1903 and 1914, in areas hitherto classed as the " white man's grave." Were it not that 1914 did not close without a call to arms demanding the sacrifice of lives in this as in other parts of the Empire, the perusal of this graph could not fail to have given pleasure to both curative and sanitary branches of the profession. To enable the loss of life in action to be eliminated, the graph for 1914 possesses a double line.

On the 1st January 1914 the non-native officials in the Service in Gambia, Sierra Leone, Gold Coast, and Nigeria numbered, respectively, 44, 216, 611 and 1,728, or a total of 2,641. In 1903, the death-rate was 20·6 and the invaliding rate 65·1 per mille; by 1913, the respective rates had fallen to 11·8 and 42·6. In 1914, the death-rate was, excluding loss in action, 12·7 and the invaliding rate (which does not show a separate calculation for those invalided on account of wounds or illness contracted " in and by the Service ") amounted to 36·4 per mille, a decrease from the previous year that bespeaks the determination of each man to stay in the country and " do his bit." Including deaths during military operations, the death-rate for 1914 would amount to 19·3 per mille; but if deaths directly due to operations in the field be excluded, as well as those " in connection with those operations," the actual death-rate would not, in 1914, have exceeded 10·5 per mille.

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*Medical Journal of Australia (Sydney)	1914—	Vol. 1—

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NOTE.—The Director would consider proposals for the exchange of the Bureau publications with other medical and scientific journals in which original papers on tropical diseases or parasitology are published.

LIST OF REFERENCES.

[Continued from BULLETIN, Vol. 4, pp. xxxi-lix.]

For the benefit of recipients of the Bulletin who wish to make a Card Catalogue, or to preserve a consecutive record of the references on any subject, galley proofs [*'Korrekturbogen'*; *'Première'*] of the Quarterly Lists of References (printed on one side of the page) can be supplied at the subscription price of **Two Shillings** per annum. They are obtainable from the beginning of 1914 onwards. Application should be made direct to the Bureau.

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For the benefit of recipients of the Bulletin who wish to make a Card Catalogue, or to preserve a consecutive record of the references on any subject, galley proofs [‘*Korrekturbogen*’; ‘*Première*’] **of the Quarterly Lists of References** (printed on one side of the page) **can be supplied at the subscription price of Two Shillings per annum. They are obtainable from the beginning of 1914 onwards. Application should be made direct to the Bureau.**

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[Much of the paper is a Portuguese version of one previously published in the *Bull. Soc. Path. Exot* Vol. 7. pp. 395–398 (May, 1914). (See this *Bulletin.* Vol. 4. p. 272.) In addition two other avian trypanosomes are described, namely, a trypanosome in *Grallaria varia imperator,* and another (named *T. pedrozi*) in *Crax sclateri.* Text figures are given.]

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